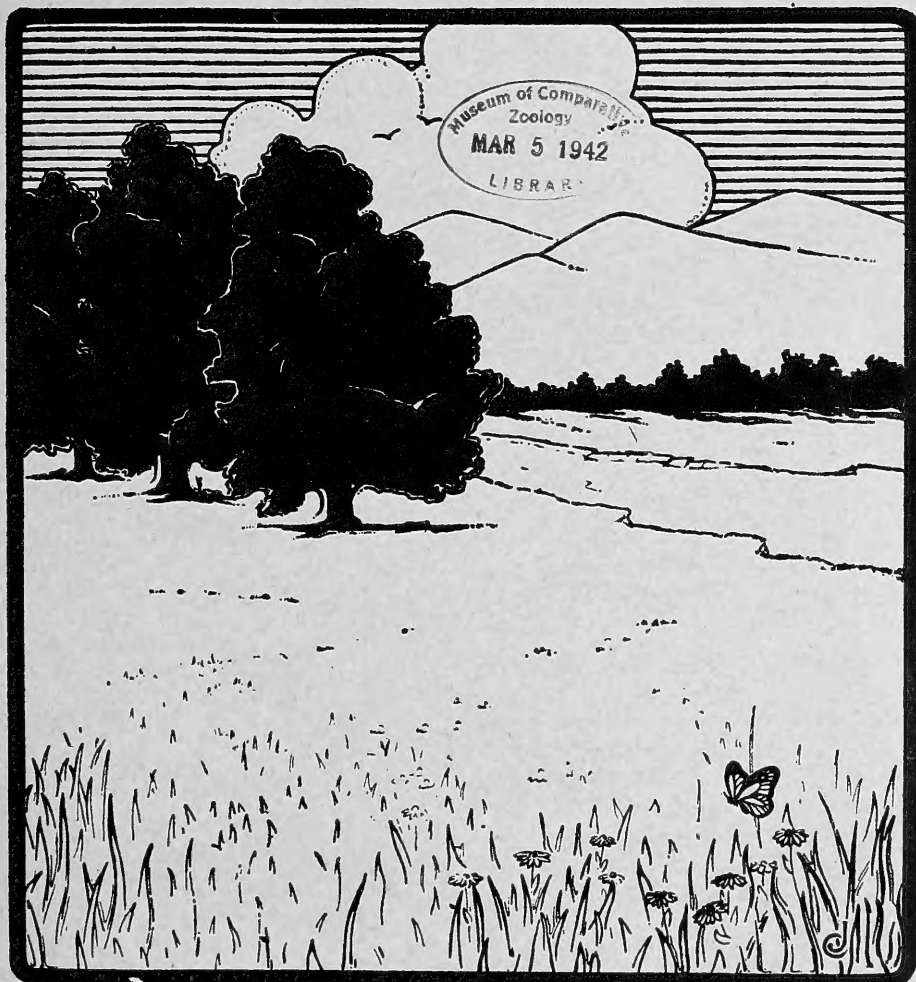








# THE CANADIAN FIELD-NATURALIST



**OTTAWA FIELD-NATURALISTS' CLUB**

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## CONTENTS

PAGE

The Spring Ladies' Tresses ( <i>Spiranthes Vernalis</i> Engelm & Gray) in Canada. By Henry Mousley.....	1
The Dermaptera of Ontario. By F. A. Urquhart.....	3
A Sea Urchin from the Cretaceous in Manitoba. By E. Leith.....	4
Fourth Census of Non-Passerine Birds in the Bird Sanctuaries of the North Shore of the Gulf of St. Lawrence. By Harrison F. Lewis.....	5
Birds of Leeds County, Ontario. By G. C. Toner, W. E. Edwards & Murray W. Curtis...	8
Book Reviews:—	
Butterflies. By A.W.A.B.....	12
Annual Report of the Forest Insect Survey, 1940.....	12
Atlantic Shells.....	12
Sixty-Third Annual Meeting of the Ottawa Field-Naturalists' Club, Report of Council.....	13
Statement of Financial Standing, Ottawa Field-Naturalists' Club, December 8, 1941.....	14

The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes: and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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PLATE I

*Spiranthes vernalis* (Engelm. & Gray)

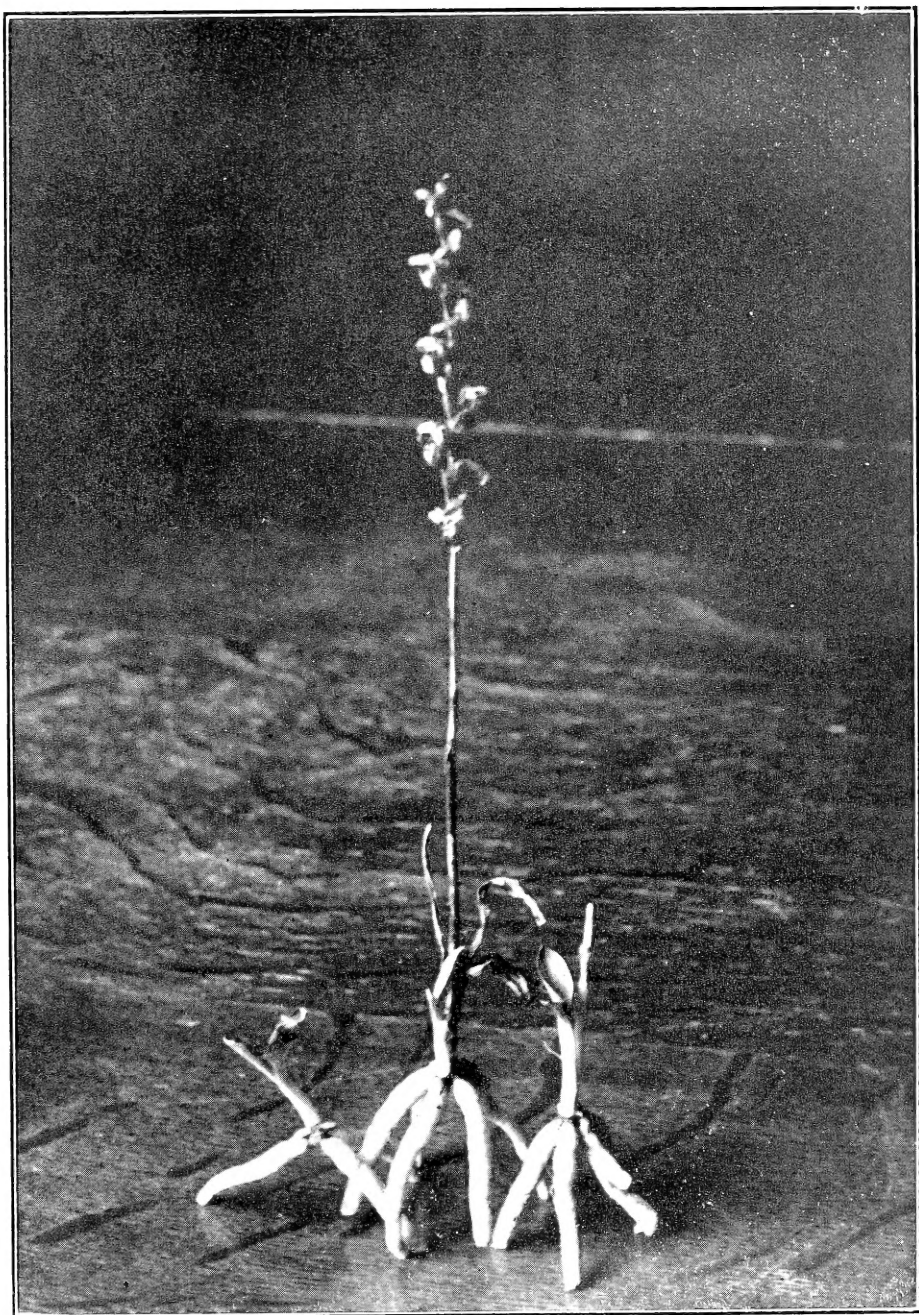


PLATE II

*Spiranthes vernalis* (Engelm & Gray)

Showing underground development of tubers, Sept. 29, 1941



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## THE SPRING LADIES' TRESSES (*SPIRANTHES VERNALIS* Engelm. & Gray) IN CANADA

By HENRY MOUSLEY

IN MY RECENT paper published in *The Canadian Field-Naturalist*<sup>1</sup> of September last, I described the unexpected finding in 1923 of this rare southern orchid, *Spiranthes vernalis*, at Hatley, Quebec. I also stated that I had since been fortunate in extending its range some one hundred and twenty miles further north, that is, to within twenty miles north of Montreal, also in the Province of Quebec. It is with this further extension that the present paper proposes to deal, as well as to give some account of the underground development of the species.

This *Spiranthes* was first discovered in Texas (Engelm. & Gray, 1845) where it blooms from January to May and is appropriately known as the "Spring Tresses". Further north, in Maryland and New Jersey, where it blooms in July, "Summer Tresses" might suit it better, whilst here in its most northerly station (so far discovered) I think the synonym "Narrow-leaved Ladies' Tresses" would be more appropriate. I first came across it on August 26, 1941, whilst out with a party of mycologists from the United States, but knowing little or nothing of mycology, I soon wandered off to some woodcock ground. It was whilst en route there that I had to pass through a portion of a wood that had been cut over several years ago, but which is now beginning to grow up again. The site lay at the top of some sloping ground of which the soil is of a somewhat sandy loamy nature. It was amongst the more open spots that the orchids were usually found growing, often under, or amongst patches of Bracken fern (*Pteridium aquilinum*) with which

the ground was more or less covered. Here and there, but more especially at the foot of the sloping ground, where it is damper, the Nodding Ladies' Tresses (*Spiranthes cernua* (L.) Rich.) were found growing singly or in little clusters. On the higher and dryer ground however *Spiranthes vernalis* (Engelm. & Gray) grew quite by itself and usually singly, there being roughly about one hundred plants. These ranged in height from 17 cm. to 38 cm., the average height of 57 measured plants coming out as 28.24 cm., whilst the average length of the racemes worked out as 9.2 cm., the longest raceme measuring 14.5 cm. These measurements are in excess of the 116 plants measured at Hatley, in 1923, where the tallest plant was 33 cm., and the average 21 cm., with an average raceme of 5.8 cm., the longest raceme in this case being 10.5 cm.

The nature of the soil was very similar to that at Hatley, only somewhat richer, and the plants in this case (as there) were growing on the higher and dryer ground. In plate 1, three of these plants are seen in their natural surroundings, the photograph depicting the characteristic one-ranked raceme in regular spirals or long secund flights. As already pointed out in my previous paper, the plants are very different from those of *S. cernua*, not only in their tall and elegant tapering racemes, but also in their creamy yellowish tinge, as compared with the snow-white blooms of *S. cernua*.

Whilst living at Hatley I became greatly interested in the underground development of the Hooded Ladies' Tresses (*Spiranthes Romanzoffiana* Cham.), as well as in the Nodding Ladies' Tresses (*S. cernua* (L.) Rich.), and I published two papers in the *Orchid Review*<sup>2</sup> on this phase of Orchidology.

1. Can. Field-Nat., vol. LV, No. 6, Sept. 1941, pp. 79-80, 2 pls.

Summing up the results of those studies, it seemed evident to me that, in the main, Drummond was right in 1810, when he states "Buds destined to flower the following year are formed among the leaves at the bottom of the flower stalk . . . the following spring each bud puts forth a pair of oblong knobs . . . and becomes a separate plant," although I do not agree with him "that in the Spring each bud puts forth a pair of oblong knobs . . . and becomes a separate plant". I maintain that these buds are put forth in the Fall of the year, as was clearly shown in my photographs taken at that period, and not in the Spring. I also believe that there is no such thing as each bud becoming a separate plant. In the case of *S. cernua*, I found that each bud also puts forth a pair of tiny oblong knobs in the Spring of the year following, and not in the Fall as in the case of *S. Romanzoffiana*, and furthermore I expressed the opinion that wet places are conducive to long slender tubers, and dryer loamy soil to much thicker ones, the latter being also correlated with broader leaves. Dry ground appears to induce greater tuberisation, creating larger reservoirs to draw upon in case of drought. In wet places there is apparently no need to store up water, hence the horizontal growth of the tubers in such situations is probably due not only to the soft nature of the soil but also to the presence of water near the surface. In dry ground the tubers grow downwards to the moisture which is lacking near the surface of the soil.

With regard to the present species, *S. vernalis*, I find that its underground development agrees exactly with that of *S. Romanzoffiana*, both as regards the putting forth of the new bud in the Fall as well as in the general stout and fleshy appearance of the tubers and their general tendency to grow downwards. In plate 2, the central figure represents a plant of *S. vernalis* in fruit dug up on September 29, which at that date incidentally shows little signs of the two knobs at the base of the new bud. There was only a slight swelling where they will eventually appear a little later, this swelling being too slight to be noticeable in the photograph. In the plant on the

right, however, (dug up on the same date) these two small knobs are plainly visible at the base of the bud. The knob on the right is a trifle larger than the other, whilst the plant on the extreme left (also dug up on the same date) shows two quite well formed equal knobs or tubers at the base of the bud.

In all these three cases the new bud is attached to the parent plant as in *S. Romanzoffiana* and *S. cernua*, with no indication whatever of each bud becoming a separate plant—as stated by Drummond in 1810, at least, as regards the first-named species. In the case of *S. cernua* (growing on the same ground as *S. vernalis*) I dug up several plants towards the end of October, but in most cases the knobs were either very tiny or appeared only as swellings at the base of the buds.

This condition entirely agrees with my experience at Hatley, where these knobs did not appear as a rule until the following spring as already mentioned. In the case of this species, it is quite possible that richness of soil, locality, and general environment may tend to hasten development of these knobs or tubers. At Hatley in 1923, I examined a large number of these plants on November 29, at which date the new leaves were well developed but the tiny knobs (apparently two when visible) were very small indeed, being merely swellings in most cases. Unfortunately, a ground fire sweeping through the woods at the end of September badly scorched a large portion of the orchid ground but, I think, has not damaged the roots, only the tops of the new buds in some cases being affected.

In conclusion, the present site is within a mile of the little bog, where, on June 27, 1940, I discovered the small Southern Twayblade (*Listera australis* Lindl.), and now, on August 26, 1941, *Spiranthes vernalis*. The finding of these two rare southern orchids in such a short time is an event not easily to be forgotten. Specimens of both these orchids have been presented to the National Herbarium at Ottawa, the Herbarium of the Botanical Institute of the University of Montreal, and the Botanical Museum of Harvard University.

2. Orchid Review, vol. 32, 1924, Mch. & Oct. Nos. pp. 71-77, 6 figs.; pp. 296-300, 6 figs.



# A SEA URCHIN FROM THE CRETACEOUS IN MANITOBA

By E. LEITH

Department of Geology, University of Manitoba

A SMALL collection of fossils containing a sea urchin was collected from Cretaceous shales at Wawanesa, Manitoba, by Messrs. G. Scott and R. Ellis, and this collection was deposited at the Manitoba Museum through the courtesy of Mr. S. Criddle of Treesbank, Manitoba. The fossils were made available for study by the writer through the kindness of the Manitoba Museum Association.

The find of the sea urchin is of especial interest since echinoids are very rare in the Cretaceous of the Interior Province in United States and Canada. In Canada, echinoids from Cretaceous formations of the interior have hitherto been reported only from Alberta. A specimen of *Hemiaster humphreysianus* Meek and Hayden was collected from shales on the Smoky River<sup>1</sup> and seven specimens of *Cassidulus taylori* Warren were collected from the Birch Lake sandstone at Birch Lake<sup>2</sup>. The writer is greatly indebted to Dr. McLearn<sup>3</sup> of the Geological Survey of Canada for the information that in 1914 he collected a poorly preserved specimen of an echinoid from the Alberta shale in the Blairmore area, and that recently Dr. Wickenden of the Geological Survey of Canada obtained fragments of echinoid plates and spines from Cretaceous beds in Manitoba.

The following species in the collection, excluding the echinoid, were identified:

*Baculites compressus* Say

*Eutrephoceras* sp. cf. *dekayi* (Morton) ?

*Acanthoscaphites nodosus* (Owen)

*Inoceramus nebrascensis* Owen

*Baculites compressus* is represented by only a single living-chamber. The *Eutrephoceras* is a large specimen, but unfortunately is very poorly preserved. Very probably it is conspecific with the type known as *E. dekayi* (Morton) from Cretaceous formations in the interior. *Acanthoscaphites nodosus* is represented only by two

fragmentary and distorted specimens so that neither of the varieties, *quadrangularis* Meek and Hayden or *brevis* Meek, could be recognized. *Inoceramus nebrascensis* is preserved as a left valve in good condition. Kirk<sup>4</sup> obtained the four species identified in this collection from near the top of the Riding Mountain beds on the Souris River near Wawanesa.

According to Kirk<sup>5</sup> the top of the Riding Mountain beds lies on the river, one mile south of Wawanesa, or in a position just stratigraphically above and upstream from the shales at the site of the new dam at Wawanesa where the fossils were collected. The horizon for the echinoid is thus, evidently, high up in the Riding Mountain beds. Landes<sup>6</sup> correlates the Riding Mountain beds with the Bearpaw of Saskatchewan and Alberta.

Unfortunately only a part of the upper surface of the echinoid is preserved (see plate 1, fig. 1\*) and the details on this surface are not very distinct. The specimen does not appear to have been flattened by pressure or distortion. In the Manitoba specimen the distinctly flat upper surface and broad, depressed, ambulacral petals, together with very short posterolateral ambulacral petals, are strongly suggestive of *Hemiaster humphreysianus* Meek and Hayden. However, the pores are more elongate, the anterolateral ambulacral petals are not bent and the posterolateral ambulacral petals are less divergent, as those of *H. humphreysianus*. Hence the Manitoba specimen very probably represents a new species, but until better material is available for study the best identification at present seems to be *Hemiaster* cf. *humphreysianus* Meek and Hayden.

3. Personal communication.

4. Kirk, S. R. "Cretaceous Stratigraphy of the Manitoba Escarpment". Geol. Surv. Canada, Sum. Report, 1929, Part B, p. 126b, 1930.

5. Op. cit., p. 125b.

6. Landes, R. W. in Russell, L. S. and Landes, Geol. Surv. Canada, Mem. 221, p. 191, 1940.  
R. W., "Geology of the Southern Alberta Plains".

\* For Plate I, see opposite page 12.

1. Dawson, G. M. "Report of Progress for 1879-80". Geol. Surv. Canada, pp. 123b-124b, 1881.

2. Warren, P. S. "A Marine Fauna in the Birch Lake Sandstone, Alberta". Trans. Roy. Soc. Canada, 3rd ser., Vol. 20, sec. IV, p. 11, 1926.



FOURTH CENSUS OF NON-PASSERINE BIRDS IN THE BIRD  
SANCTUARIES OF THE NORTH SHORE OF THE  
GULF OF ST. LAWRENCE

By HARRISON F. LEWIS

IN 1925 the Government of Canada established ten bird sanctuaries on islands and adjacent waters along the north shore of the Gulf of St. Lawrence, in Saguenay County, Quebec. Censuses of the non-passerine population of breeding birds in these sanctuaries were taken in 1925, 1930 and 1935 and have been reported in previous papers (Lewis, 1925, 1931, 1937). Descriptions of the sanctuaries, of some of the principal factors affecting their avian populations, and of the manner of arriving at the census totals are set forth in those papers.

A similar census, taken in 1940 in this system of sanctuaries, is reported on in this paper. A change had, however, taken place in the system between 1935 and 1940. Because of its small and dwindling bird population, Cape Whittle Bird Sanctuary was cancelled on March 16, 1937, and was replaced on that date by Carrousel Island Bird Sanctuary. The latter sanctuary consists of Carrousel Island, situated in Latitude 50° 6' north, Longitude 66° 23' west, off the entrance to the Bay of Seven Islands, and of an area of water surrounding the island. The non-passerine birds breeding on Carrousel Island are shown in Table I.

As a result of this change, we have now records of regular quinquennial censuses, from 1925 to the present, in only nine sanctuaries in this

region. The change was good for bird protection, but disturbing to our series of population statistics. The 1940 census figures for Carrousel Island Bird Sanctuary have been included in the accompanying tables and have been taken into account in arriving at the totals and percentages shown. This was done because the census was viewed as a census of the breeding non-passerine birds of this entire sanctuary system, which retains its identity in spite of replacement of one of its members. As the census results are published in sufficient detail to supply the total number for each species in each bird sanctuary in each census year, any one having a different object in view can readily re-arrange the data to suit his particular purpose.

The only conspicuous change in the composition of the bird population of this sanctuary system that was brought about by replacement of Cape Whittle Bird Sanctuary by Carrousel Island Bird Sanctuary relates to the Atlantic Kittiwake (*Rissa tridactyla tridactyla*). Prior to 1937, the only Kittiwakes nesting in this sanctuary system were a few pairs in Betchouane Bird Sanctuary. These increased threefold between 1935 and 1940, but addition to the sanctuary system of Carrousel Island Bird Sanctuary, containing 500 breeding birds of this species, is chiefly responsible

TABLE I.  
Census in the Bird Sanctuaries Along the North Shore of the Gulf of St. Lawrence, 1940.

BIRDS	SANCTUARIES										Total
	Carrousel Islands	Birch Islands	Betchouane	Watshishou	Fog Island	Wolf Bay	St. Mary Islands	Mecatina	St. Augustin	Bradore Bay	
Red-throated Loon.....					18	6	16	28	22		90
European Cormorant.....				60			172				172
Double-crested Cormorant	272			4	112	366					810
Black Duck.....				4	4					6	14
Green-winged Teal.....		2									2
Southern Eider.....	80	1,648	1,304	1,100	1,012	1,600	930	1,830	1,500		11,004
Red-breasted Merganser.....				2					2		4
Willow Ptarmigan.....					2						2
Semipalmated Plover.....				2	14		10	24	20	8	78
Spotted Sandpiper.....	2	12	8	28	30	12	20	18	32	8	170
Great Black-backed Gull.....	4	18	16	156	258	244	234	1,134	902		2,966
Herring Gull.....	600	606	460	150	162	280	702	740	812		4,512
Ring-billed Gull.....					270			68	58		396
Atlantic Kittiwake.....	500		18								518
Common Tern.....		6		300	18	8	8				340
Arctic Tern.....			2	8	36						46
Tern (Common or Arctic).....								26			26
Caspian Tern.....					66						66
Razor-billed Auk.....	56		240	28	42	2,562	4,414	164	4	1,386	8,896
Atlantic Murre.....					3,300	2,310	6,846			104	12,560
Brünnich's Murre.....							2				2
Black Guillemot.....	176	30		28	150	4	246	660	172		1,466
Atlantic Puffin.....			750			9,182	6,162			49,350	65,444
Total.....	1,690	2,322	2,798	1,866	5,494	16,574	19,762	4,692	3,530	50,856	109,584

TABLE II.  
Four Quinquennial Censuses in the Bird Sanctuaries Along the  
North Shore of the Gulf of St. Lawrence.

BIRDS	1925	1930	1935	1940	Gain or Loss Since 1935	Per cent Gain or Loss Since 1935
Red-throated Loon .....	24	25	106	90	-16	-15%
European Cormorant .....			60	172	+112	+187%
Double-crested Cormorant .....	1,364	1,086	1,168	810	-358	-31%
Black Duck .....	6		48	14	-34	-71%
Green-winged Teal .....	2	2	4	2	-2	-50%
Southern Eider .....	6,450	8,186	11,190	11,004	-186	-2%
Red-breasted Merganser .....		32	16	4	-12	-75%
American Rough-legged Hawk .....			6			
Willow Ptarmigan .....				2	2	0
Semipalmated Plover .....	No Record	40	40	78	+38	+95%
Spotted Sandpiper .....	No Record	88	138	170	+32	+23%
Great Black-backed Gull .....	968	1,302	1,768	2,966	+1,178	+67%
Herring Gull .....	1,020	2,642	3,502	4,512	+1,010	+29%
Ring-billed Gull .....	270	376	344	396	+52	+15%
Atlantic Kittiwake .....		6	6	518	+512	+8,533%
Common Tern .....	756	1,190	858	340	-518	-60%
Arctic Tern .....	96	50	60	46	-14	-23%
Tern (Common or Arctic) .....				26		
Caspian Tern .....	60	90	84	66	-18	-21%
Razor-billed Auk .....	10,580	14,488	7,620	8,896	+1,276	+17%
Atlantic Murre .....	7,240	8,048	12,208	12,560	+352	+3%
Brünnich's Murre .....				2	+2	0
Black Guillemot .....	320	750	836	1,466	+630	+75%
Atlantic Puffin .....	55,550	62,562	71,914	65,444	-6,470	-9%
Short-eared Owl .....			2			
Total .....	84,706	100,964	111,978	109,584	-2,394	-2%

for the very great proportional increase of the Kittiwake that is shown in Table II.

The figures for 1940, as shown in Table I, include, as was the case in the reports of previous censuses, some estimates and some results of exact counts. This matter was discussed at some length in the paper cited below as published in 1931.

The European Cormorant (*Phalacrocorax carbo carbo*) nests in this system of sanctuaries only on Cliff Island, in St. Mary Islands Bird Sanctuary. This colony, founded in 1930, made an encouraging increase of 187 per cent between 1935 and 1940.

It is a matter of regret that the population of the Southern Eider (*Somateria mollissima dresseri*) in this sanctuary system is indicated by the figures in Table 2 to have decreased by 186 birds in the five years prior to 1940. The fortunes of this species in the several sanctuaries in which it nests have been quite varied in the interval in question, but its population in the entire system would, in the final comparison, have shown a slight increase but for a fortuitous adverse circumstance. A white fox (*Alopex lagopus ungava* (Merriam), conveyed from more northern regions on drift ice in the spring of 1940, spent the summer of that year on Eastern St. Mary Island,

the largest and best bird island in St. Mary Islands Bird Sanctuary. Such occurrences are not at all infrequent in this region. The fox, of course, destroyed some of the birds and many of the eggs on the island where it was stranded. Bird species differ in their reaction to such an intrusion, but the common reaction of the Southern Eider is to abandon for the season the island on which the marauder is living. This explains why Eastern St. Mary Island, which is usually the home, in June, of about 600 Eiders, had only 20 of this species in its bird population in June, 1940. It is confidently expected that this local recession of the Eider population on this island will be only temporary.

Willow Ptarmigan (*Lagopus lagopus*) have been known to nest in Fog Island Bird Sanctuary in other recent years, as, for example, in 1928 (Lewis, 1928), but have not previously been found there in a year in which a census was taken in the sanctuaries of this region.

Encouraging increases are shown by the shore-birds and gulls that nest in these sanctuaries. The Great Black-backed Gull (*Larus marinus*), which consumes eggs and young of other birds, particularly of the Southern Eider, has, indeed, become so numerous in this region as to be unduly destructive, with the result that it has

TABLE III.  
Four Quinquennial Censuses in the Bird Sanctuaries Along the North Shore of the Gulf of St. Lawrence.

Sanctuaries	1925	1930	1935	1940	Per Cent Gain or Loss 1935	Per Cent Gain or Loss 1935	Per Cent Gain or Loss 1925
Carrousel .....				1,690			
Birch Islands .....	692	2,004	2,514	2,322	-192	-8%	+236%
Betchouane .....	1,364	2,424	1,808	2,798	+990	+55%	+105%
Watshishow .....	4,880	4,972	3,798	1,866	-1,932	-51%	-62%
Fog Island .....	1,794	4,668	6,906	5,494	-1,412	-20%	+206%
Wolf Bay .....	6,068	14,114	11,314	16,574	+5,260	+46%	+173%
Cape Whittle .....	3,978	1,082	212				
St. Mary Islands .....	9,340	11,788	16,206	19,762	+3,556	+22%	+112%
Mecatina .....	962	1,282	2,868	4,692	+1,824	+64%	+388%
St. Augustin .....	328	820	2,246	3,530	+1,284	+57%	+976%
Bradore Bay .....	55,300	57,810	64,106	50,856	-13,250	-21%	-8%
Total .....	84,706	100,964	111,978	109,584	-2,390	-2%	+29%

become necessary to institute special measures for its control, both in some of the sanctuaries and in the non-sanctuary part of the region. Control measures in the sanctuaries are limited to collecting the eggs and destroying the nests of these gulls. Such measures have been in effect in St. Mary Islands Bird Sanctuary since 1931 and in Wolf Bay and Mecatina Bird Sanctuaries since 1937. In spite of the effect of these measures, the number of breeding Great Black-backed Gulls in this entire sanctuary system showed, between 1935 and 1940, an increase of 67 per cent.

It is unfortunately not possible to state the specific identity of 26 Terns in Mecatina Bird Sanctuary that are recorded in Tables I and II as "Tern (Common or Arctic)". They were carefully recorded by Officer Elton Jones, prior to my arrival in 1940 at this sanctuary, as 13 pairs of Terns with nests and eggs, but when, in his company, I visited, on July 11, 1940, the small bare island where these birds had nested, it was found that for some unknown reason they had entirely deserted it, although some eggs remained in the nests.

The population in these sanctuaries of the Razor-billed Auk (*Alca torda*) showed, between 1930 and 1935, a sharp decline of 47 per cent, which was the subject of special comment in the cited paper published in 1937. The cause of this heavy loss was unknown and it was feared that the downward trend of population might continue. It is encouraging to be able to report that, although the reason for the previous decrease has not been ascertained, the Razor-bill population of these sanctuaries shows, for the interval between 1935 and 1940, a substantial increase of 17 per cent.

Brünnich's Murre (*Uria lomvia lomvia*), a species not found during the taking of previous censuses

in these sanctuaries, is included in the present report on the basis of its regular annual occurrence on Cliff Island, in St. Mary Islands Bird Sanctuary, where it appears to be breeding in a deep cleft in the face of a rock cliff. Many Atlantic Murres (*Uria aalge aalge*) have their eggs in this fissure and one or two Brünnich's Murres are regularly present with them. The occurrence of this species, not known elsewhere along the north shore of the Gulf of St. Lawrence, was discovered at this place by Dr. R. A. Johnson in 1938, (Johnson, 1940). Only one Brünnich's Murre was seen here when the census count was made, on July 5, 1940, but it is presumed that a pair, previously observed by the sanctuary caretaker, were present.

The Black Guillemot (*Cepphus grylle grylle*), which nests in scattered pairs rather than in densely populated colonies, shows an excellent increase of 75 per cent in these sanctuaries in the interval between 1935 and 1940.

On the other hand, the Atlantic Puffin (*Fratercula arctica arctica*), whose habit it is to assemble in dense colonies for nesting, shows in the same interval a decrease of 9 per cent, the first decrease of this species recorded in this series of quinquennial censuses. Examination of the detailed reports shows that the Puffin nests in four of these sanctuaries, increased substantially in three of them in the 1935-1940 interval, but decreased in the fourth (Bradore Bay Bird Sanctuary) by about 13,000 birds out of a 1935 population of 62,418. The cause of this heavy decrease is apparently local and is being sought.

This report of the 1940 census of the breeding non-passerine birds in the bird sanctuaries along the north shore of the Gulf of St. Lawrence reflects the inevitable ups and downs to be encountered in the course of a continued effort on

a large scale to assist a varied and widely-distributed bird population to maintain itself and to prosper. The slight decrease in the total population that is registered by this census is chiefly due to a decrease of the Puffin population in one sanctuary. It is hoped that the non-passerine bird population of this sanctuary system, which appears, on the whole, to be in a satisfactory state, will show an increase in the next five-year period that will more than wipe out this minor diminution.

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## BIRDS OF LEEDS COUNTY, ONTARIO

By G. C. TONER, W. E. EDWARDS and MURRAY W. CURTIS

VERY LITTLE has been written about the birds of Leeds county. Compared with that of other regions, near centres of population, the literature is scanty and scattered. The earliest reference is by Smith (23) who mentions eagles nesting on the cliffs of Gananoque lake in the year 1817. The bald-headed eagle still nests in trees not far from the tallest of these rocks. Vennor (27), writing in 1876, told of eagles and ospreys along the lakes of the Rideau canal. These two citations are all that appear in the literature up till the year 1895.

In 1889 the Rev. C. J. Young was appointed rector of the parish of Lansdowne where he remained until 1901. Young was an extraordinary personality for his times. He had studied birds in Great Britain and found an entirely new field for his efforts in Canada. He was an oologist and collected many sets of eggs in Leeds county but unfortunately fire destroyed his home at Brighton, where he lived after retirement, and most of his collections were burnt. All we have to-day are his published notes in *The Ottawa Naturalist* and his contributions to the *Catalogue of Canadian Birds* of the Geological Survey.

Young was just one of a trio of bird students who worked this region in the 1890's and the early 1900's. Dr. C. K. Clarke of Rockwood Hospital and Edwin Beaupre of Portsmouth were associated with Young in excursions to various parts of Leeds. Beaupre's diary, which is now in the Royal Ontario Museum of Zoology, mentions Young in many entries and the two men were

friends for many years. P. M. Beaupre, Edwin's brother, tells a story of Young appearing one evening at the family home, opening the door and crying out; "Edwin, there are four in the nest." They had been watching a bald-headed eagle's nest and apparently the bird had laid four eggs, an extraordinary feat it seemed to these enthusiastic students.

In the 1920's another group of students centred around the Tuxis Boys' Camp\* at Hudson Point near Brockville. Hoyes Lloyd, Superintendent of Wildlife Protection for Canada, was a visitor to this camp and under his guidance a number of the youngsters became interested in the study of birds. Both of the junior authors of this paper (W.E.E. and M.W.C.) attended the camp and worked with Mr. Lloyd. Dr. C. H. D. Clarke was an instructor here in 1926, and one of our valued contributors. W. J. Miller, of Brockville, attended in the years 1923-24.

The greater part of the county of Leeds is underlain by pre-Cambrian rock, which form a rough triangle. The apex of this triangle crosses the St. Lawrence river to form the Thousand Islands. On each side of the triangle are beds of sedimentary rocks, mostly of Ordovician age. To some extent, both the pre-Cambrian and the

\* It is surprising to note the influence that this Hudson Point camp had in the study of birds in Ontario. No less than four bird students have developed among the boys who were in attendance. The example and inspiration of Mr. Lloyd encouraged these young men and, in fact, this paper is directly due to his efforts. (G.C.T.)



sedimentary rocks are covered with glacial drift. Coleman (11) has shown that in the late Pleistocene the seas almost covered the county, but at the present time the elevation is between 200 and 70 feet above sea level. Only two areas are over 600 feet; Blue Mountain near Charleston lake and the hills north of Westport.

The county has been completely mapped by the Surveyor General on the following sheets: Mallorytown, Brockville, Merrickville, Perth, Westport, Gananoque and Tichborne; scale one inch to the mile, National Topographic series. All the place names used throughout the paper have been taken from these maps.

There are over 85 lakes in the county, varying in size, from ponds like Moss lake—about two acres in extent—to Big Rideau lake with a water surface of over 23 square miles. Most of these lakes are in the central and northern parts of the county, over the pre-Cambrian rocks; some are in the limestone area northwest of Brockville. Some of the lakes are shallow, containing great marshes; others are deep, clear and cold. Toner (26) has summarized much of the information on the lakes of the county.

Four river systems drain Leeds: the chain of Rideau lakes and the canalized Rideau river flowing to the Ottawa; the Greater Cataraqui, canalized like the Rideau, emptying into Lake Ontario at Kingston; the Gananoque river, flowing south through the centre of the county to the St. Lawrence; Jones creek, with an east and west branch, draining southeastern Leeds into the St. Lawrence. Dams and barriers on these rivers hold back the water to form the lakes and marshes.

Marshes, swamps and bogs, so important to the bird life, form a considerable proportion of the water area of the county. Wiltsie creek of Gananoque lake, Lake Elvida, the Bog at Newboro, and Upper Beverly lake; each have marshes of several square miles in extent. Typical sphagnum bogs are found on the side of Blue Mountain, at the north end of Lower Beverly lake and east of No. 32 Highway near South lake. Wooded swamps, usually of *Thuja occidentalis* and various species of *Fraxinus*, cover considerable areas, particularly near Briar Hill and between Graham lake and Charleston lake.

Mesophytic forest vegetation is abundant, Leeds still retaining over 20% of its woodlands. Very few of the original trees are left but many of the wooded areas contain mature second growth. Along the St. Lawrence and on some of the

islands, *Pinus rigida* and *Juniperus virginiana* grow to quite a large size, showing the southern influence; within twelve miles, on the slopes of Blue Mountain, *Picea canadensis* and *P. mariana* are found. This mingling of northern and southern forms appears to characterize most of the woodlands of the county.

This paper lists 202 birds known to have occurred in Leeds county. Much of the information included is from the published records of others but specimens for 104 species have been examined in various collections. It is by no means the final word for much remains to be done and other species will be added, particularly among the warblers, sparrows and waders.

Much of the information has been contributed by residents of the county. Particular thanks must be given to W. J. Miller for his notes of Brockville and elsewhere in the county; to C. L. Broley of Delta; to H. W. Follmer for his records from the Thousand Islands where he is resident in the summer; and to F. E. Ferguson for his notes of South Lake. The literature records are largely from the files of the Royal Ontario Museum of Zoology, which were made available through the kindness of Prof. J. R. Dymond, Director. This part of the work was facilitated by J. L. Baillie, Cataloguer of the R.O.M.Z., who read the manuscript and contributed many valuable data. Mr. Hoyes Lloyd and Dr. C. H. D. Clarke, National Parks Bureau, helped in many ways. The authors gratefully acknowledge the assistance of these men, realizing how valuable were their contributions.

COMMON LOON. *Gavia immer*.—A rather common summer resident throughout the county where they nest around many of the lakes and on the islands of the St. Lawrence.

Bateau Point: Juvenile loons noted in 1926. (W.E.E.)

Beverly Lakes: C. L. Broley has had four nests under observation for several years. One of these contained two eggs, June 14, 1932. (G.C.T.)

Graham Lake: The R.O.M.Z. has eggs collected by C. J. Young, on the following dates; one egg, May 26, 1896; one egg, May 24, 1897; one egg, May 22, 1899. (G.C.T.)

Higley Lake: There are two sets of eggs in the R.O.M.Z., one collected June 30, 1898, by C. J. Young and mentioned in Baillie and Harrington (2), and another collected by E. Beupre on June 19, 1899. (G.C.T.)

Sand Lake: An egg taken here in July, 1935. (G.C.T.)

Wiltsie Lake: A loon's nest with two eggs noted on May 16, 1928. On a later visit, the nest

was empty, apparently robbed by some predator. (M.W.C.)

**HORNED GREBE.** *Colymbus auritus*.—This grebe is sometimes seen in the county during migration. Young (18) recorded it as breeding along the St. Lawrence but Baillie and Harrington (2) stated that these records needed confirmation.

Halstead's Bay: A hunter showed me the head of a horned grebe that he shot in the fall of 1937. (G.C.T.)

Lake Eloida: A horned grebe was shot on November 11, 1926. (M.W.C.)

**HOLBOELL'S GREBE.** *Colymbus grisegena*.—The only records for Holboell's grebe for the county are those given us by C. L. Broley who has noted the species on several occasions on Lower Beverly lake.

**PIED-BILLED GREBE.** *Podilymbus podiceps*.—This is the common grebe of eastern Ontario. The marshy bays of the River St. Lawrence and the weedy inland lakes are its breeding grounds. It is seldom noted around the deeper and more open lakes. Young (18) stated that this grebe was common between Kingston and Brockville in the years he worked the county.

Bullard's Creek: On September 9, 1938, four adults and two juveniles were noted. (M.W.C.)

Halstead's Bay: Five juveniles and one adult noted on July 15, 1936. (G.C.T.)

Rockport: Four nests of this grebe were found by Young in 1897. (18)

Wiltzie Lake: A pied-billed grebe taken October 1, 1938, is now in the R.O.M.Z. (M.W.C.)

**DOUBLE-CRESTED CORMORANT.** *Phalacrocorax auritus*.—These cormorants are on the increase and hunters should be warned that they are protected by the Migratory Bird Act. They are probably much more common than the few records given would indicate.

Gananoque: A specimen shot by a hunter, October 11, 1937, is in the R.O.M.Z. (G.C.T.)

Grenadier Island: C. H. D. Clarke noted a cormorant here on July 14, 1926.

**GANNET.** *Sula bassana*.—The gannet has been taken at least once within or near the limits of the county. According to Lloyd (17), in the fall of 1923 one was reported from the Rideau river. About a week later information was received by Mr. E. G. White stating that a gannet had been shot at Rideau lake. The locality is indefinite, and if not in Leeds, at least is within a few miles of its borders.

**GREAT BLUE HERON.** *Ardea herodias*.—Formerly, great blue herons were very abundant but were persecuted to such an extent that only a remnant of their former numbers existed at the

turn of the century. At the present time there are a number of breeding colonies in the county and the birds are increasing. Complete protection and the stricter observance of the law that prohibits summer tourists from carrying firearms have contributed to this increase. Young (18) recorded breeding colonies at Escott pond, MacIntosh Mills and Graham lake that have disappeared with the cutting of the timber and the draining of Escott pond.

Beverly Lakes: C. L. Broley states that there is a small breeding colony close to the lower lake. (G.C.T.)

Charleston Outlet: Seven nests were occupied in a small colony in 1938. The year previous, vandals had cut the tree in which were most of the nests, while the young birds were unable to fly, but the colony was not deserted. Another tree about 100 yards from the old site was used for the nests mentioned above. (G.C.T.)

Grenadier Island: A colony, with at least five nests, noted in 1937 on a small island near Pitch Pine Point. (G.C.T.)

Graham Lake: On May 14, 1901, E. Beaupre visited a colony on this lake that contained over two hundred nests. (G.C.T.)

Newboro Lake: Two nests were reported from the Bog in 1935. E. Beaupre, in his diary mentions visiting a colony of 14 nests on May 11, 1928, but does not give the exact locality. (G.C.T.)

Portland: S. S. Scovil of this village, writing to J. L. Baillie, R.O.M.Z., states that the colony of blue herons on Big Island in Rideau lake has been in existence for over fifty years. It contains over three hundred nests. Mr. Scovil mentions that many people visit this heronry each year and it is considered one of the attractions of the district. (G.C.T.)

South Lake: East of No. 32 Highway is a medium-sized colony. On July 19, 1939, there were fifteen nests occupied by half-grown young. (G.C.T.)

**AMERICAN EGRET.** *Casmerodius albus*.—The banning of plume hunting in the southern United States has resulted in a great increase in the numbers of American egrets that come north in late summer to Ontario. Unfortunately they are sometimes killed while here, a sad result of public indifference. Game protective associations and bird protection societies have a large responsibility in meeting this lethargic condition and overcoming it by education.

Gananoque: There is a specimen in the R.O.M.Z., taken from a farm youngster who shot it on August 4, 1936. (G.C.T.)

Halstead's Bay: An egret remained in this region for several weeks in the late summer of 1934. Photographs of the bird have been seen. (G.C.T.)

**GREEN HERON.** *Butorides virescens*.—This heron seems to be common around some of the lakes of the county. They have been found breeding but seem to be more abundant in the spring and fall than they are in the summer.

Beverly Lakes: C. L. Broley found a nest, June 15, 1929, with five heavily incubated eggs. (G.C.T.)

Bullard's Creek: Eight individuals noted September 9, 1938. (M.W.C.)

Charleston Lake: A set of five eggs in the R.O.M.Z. was collected on June 14, 1899, by Clarke and Young (2). Young noted other nests about the same time (18), (32).

Gananoque: W. J. Miller found one dead in a trap, October 4, 1935, at the edge of the Gananoque river north of the town. (G.C.T.)

Smiths Falls: P. A. Taverner reports that these birds were quite common between Smiths Falls and Rideau lake in the summer of 1918. (G.C.T.)

**BLACK-CROWNED NIGHT HERON.** *Nycticorax nycticorax*.—Since this heron reaches the northern limits of its range along Lake Ontario and Lake Erie, it is quite rare and only a few isolated breeding colonies are known in the province.

Beverly Lakes: C. L. Broley states that a few pair breed each year on the lower lake. (G.C.T.)

Wiltzie Lake: Night herons are occasionally seen here in the fall. (M.W.C.)

**AMERICAN BITTERN.** *Botaurus lentiginosus*.—The American Bittern is abundant throughout the county. It may often be found in quite small ponds as well as in the larger marshes of the lakes and river. The few records given are only a slight indication of its abundance.

Athens: The bittern is a common summer resident. (M.W.C.)

Brockville: W. J. Miller has many summer records from this area. (G.C.T.)

Bullard's Creek: Ten individuals noted on September 9, 1938. (M.W.C.)

Gananoque: This bittern is quite common, breeding throughout the district. (W.E.E.)

**LEAST BITTERN.** *Ixobrychus exilis*.—The least bittern is not found throughout the county but seems to live in isolated colonies. We have found it to be quite common in the wide reed beds of the river and in some of the larger marshes of the lakes.

Bullard's Creek: The least bittern is sometimes noted here. (M.W.C.)

Escott Pond: Nest with six eggs found by Young (18). The R.O.M.Z. has a female collected June 4, 1902, by G. Willis. (G.C.T.)

Gananoque Lake: Young recorded the species in the marshes of this lake (18). I noted one in late June, 1935, from here. (G.C.T.)

Halstead's Bay: I was shown four eggs of this bittern collected on May 28, 1935. (G.C.T.)

**WHISTLING SWAN.** *Cygnus columbianus*.—This swan is a rare migrant that is sometimes noted on the River St. Lawrence in the fall. Probably more abundant in the region than the records would suggest but as it is very cautious it is seldom seen.

Chaffey's Locks: An item in the Kingston *Whig-Standard*, November 27, 1932, stated that a swan, presumably of this species, was noted on the lake near Kingston. A day or so later I was on Lower Rock lake, in Frontenac but only two miles from the Leeds border, where I noted six of these birds. (G.C.T.)

Gananoque: I have been informed that a swan was shot near Black Ant Island, December 24, 1938, by a poacher. (G.C.T.)

**BLUE GOOSE.** *Chen caerulescens*.—Blue geese are uncommon migrants. According to the Brockville *Recorder and Times* of October 16, 1939, one was shot near Grape Island by W. H. Comstock, a day or so previously.

**CANADA GOOSE.** *Branta canadensis*.—The Canada goose is a common migrant, appearing in the region both in spring and fall. Large flocks of these geese will often light on the inland lakes and remain over for several days.

Athens: Dates on which these birds were noted are; March 16 and 26, 1927, and May 4, 1937. (M.W.C.) W. J. Miller reports three shot north of the village in buckwheat fields in October, 1939. (G.C.T.)

Brockville: Queen's University Biological Museum has two specimens sent in by W. H. Comstock in October, 1939, that he shot on the St. Lawrence.

Beverly Lakes: C. L. Broley informs me that on May 6, 1939, two flocks of about 70 birds came down on the lower lake in the morning. At 7.00 p.m., 230 were counted but only about 44 remained over night. (G.C.T.)

Gananoque: Geese were noted on April 6, 1928, and on April 6, 1929. (W.E.E.)

Mud Creek: J. Thompson tells me that many geese were shot during the 1890's on the flooded plains near the Frontenac line in late fall. (G.C.T.)

Newboro: From W. J. Miller's notes; "On May 2, 1934, shortly after eight o'clock in the morning, a flock of geese circled the Bog and settled for the day. About six in the evening they left, continuing northward. They flew in two flocks, V-formation, each of the same

size. I counted twenty-five birds in one flock. The same fall, near the end of October, geese were again noted in the Bog." (*G.C.T.*)

BRANT. *Branta bernicla*.—There are only a few definite records for the brant. Macoun (18) noted it as casual in Lake Ontario and the hunters state it is sometimes seen on the river. Mr.

Taverner tells us that the National Museum of Canada has a specimen, taken November, 1938, on Mississippi lake, north of the region with which we are concerned.

Black Ant Island: A brant was shot on November 19, 1938. (*G.C.T.*)

(*To be continued*)

## BOOK REVIEWS

BUTTERFLIES, *A Handbook of the Butterflies of the United States, Complete for the Region North of the Potomac and Ohio Rivers and East of the Dakotas*. By Ralph W. Macy and Harold H. Shepard. The University of Minnesota Press, Minneapolis, 1941. Price \$3.50.

From a scientific viewpoint this book adds little to Scudder's three-volume monograph of the butterflies of the eastern United States and Canada; but, as the authors say, it does bring the information within the reach of the interested laymen and indeed of the practising entomologist.

This is a very nice little book, concisely and logically arranged, and beautifully put out. It is a pleasure to dip into at any page, the accounts of each species, and especially the general introduction, making good reading. The related fields of ecology, plant geography, and insect physiology have been introduced with skill.

The keys for determination are adequate enough, but one cannot help wishing that the plan of illustration had been carried out for all species. The half-tone plates of the skippers, a difficult group, are welcome, but in many cases are insufficiently well defined. It is surprising that in such a complete account of the field, no mention was made of the variety *clarki* of *Incisalia niphon*, which would apparently be the form to be found in the pine forests of north-eastern Minnesota.—A.W.A.B.

ANNUAL REPORT OF THE FOREST INSECT SURVEY, 1940. *Division of Entomology, Science Service, Department of Agriculture, Ottawa, 1941.*

The fifth report of the Forest Insect Survey, the second to be printed, contains 10 maps of the

principal outbreaks of the year, a table showing the forest insect situation in 25 regions throughout Canada, and a discussion of the infestation status of 140 species of greater or less importance.—ED.

## ATLANTIC SHELLS

Books dealing with the sea life of our east coast are still scarce. This lack is noticeable in the case of our shells. Here there is immediate aid in sight, as Mr. W. J. Clench, the Curator of Mollusca in the Museum of Comparative Zoology, Cambridge, Massachusetts, has inaugurated a new publication, "Johnsonia". This series will be issued at cost price in several parts. Each one will cover a genus of shells inhabiting the western Atlantic water between Patagonia and Greenland. The method of treatment is designated to satisfy the needs of both specialist and beginner.

In the first part, which is at hand, W. J. Clench and R. T. Abbott treat the genus *Strombus*, popularly known as "conchs". It is a handsome piece of printing. There are twelve pages of heavy, glazed paper of typewriting size (8½" x 11") including ten plates. The illustrations set a high standard of excellence and the descriptive text is lucid. In addition, there are notes on synonymy and other matters, and a key. This first number sells at forty cents, plus postage (in Canada and 10% exchange). This series should be valuable alike to the sea-side visitor, to the shell-collector and to the marine zoologist.

Further information may be obtained from the editor of "Johnsonia" or from the undersigned.—JOHN OUGHTON, *Royal Ontario Museum of Zoology, 100 Queen's Park, Toronto.*



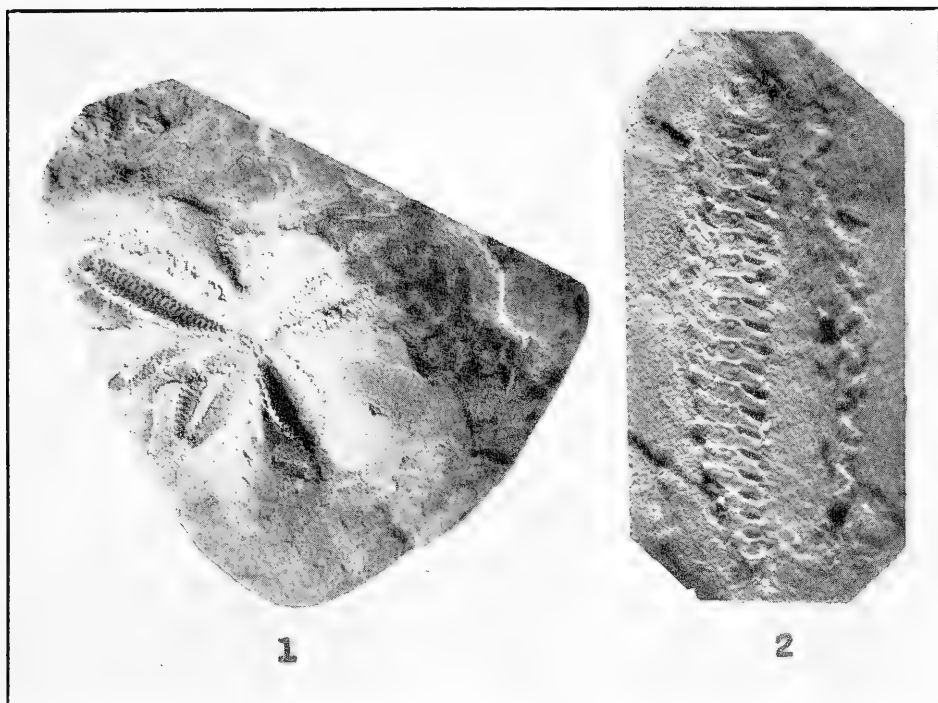


PLATE I

To illustrate "A Sea Urchin from the Cretaceous in Manitoba" on Page 5

*Hemiaster cf. humphreysianus* Meek and Hayden

Riding Mountain beds, Cretaceous, Wawanesa, Manitoba.

Manitoba Museum Association number 445

*Fig. 1.* Upper surface. x 2.

*Fig. 2.* Left anterolateral ambulacrum petal. x 7.



## SIXTY-THIRD ANNUAL MEETING OF THE OTTAWA FIELD-NATURALISTS' CLUB REPORT OF COUNCIL

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Since the last annual meeting there have been two meetings of council. These meetings have been held at the residence of the President.

**EXCURSIONS COMMITTEE.**—Three meetings of the Excursion Committee were held. One was held in the spring to draw up the programme of spring and summer excursions, and two in the autumn to deal with autumn excursions and winter lectures.

Seven excursions were carried on during the year: May 10, Britannia; May 17, Kingsmere; May 31, Taylor's Hill; June 7, Arboretum; Sept. 13, Rideau River via Bowesville Road; Sept. 27, Gatineau Park; Oct. 4, Mine Road.

New ground was covered in the excursions along the east side of the Rideau River and toward Mine Road. The Gatineau Park trip was more in the nature of a hike and the park was crossed from Kingsmere to Meach Lake road during the short afternoon. The committee particularly wishes to express its gratitude to Mr. E. S. Richards, Superintendent of the Park, for guidance rendered the excursion group through the services of two of the park rangers.

**LECTURES.**—Six lectures were held as follows: Jan. 16, "The Magdalen Islands", by Dr. F. J. Alcock; Feb. 20, "Cross-breeding of Poppies", by Dr. C. C. Heimbürger; Mar. 20, "Insects and Disease", by Mr. C. R. Twinn; Apr. 24, "The Gatineau Park", by Mr. E. S. Richards; Nov. 13, "The Cultural Value of Nature Study", by the Rev. F. E. Banim; Dec. 11, "Mammals of the Ottawa District", by Dr. C. H. D. Clarke. The lectures were held in St. Patrick's College and the committee acknowledges with great appreciation the service thus rendered to the Club.

Receipts from all sources in connection with these committees total \$26.25. Expenses were \$16.92, leaving a balance on hand of \$9.33.

**PUBLICATIONS.**—The publications committee report a successful year's activities in carrying on

the duties assigned. During the year Dr. C. H. D. Clarke resigned as editor of the Canadian Field-Naturalist and was succeeded by Dr. A. W. A. Brown under whose guidance the magazine is at present being published.

Following the annual business meeting on December 10, 1940, the members and general public present were addressed by Dr. R. W. Thompson, D.Sc., Ph.D., F.R.S., of the Imperial Institute of Entomology, Belleville, Ontario, on "The Balance of Nature".

**BIRD CENSUS.**—The annual bird census in the Ottawa district was taken on December 22, 1940 between 7.30 a.m. and 4.10 p.m. Ten observers took part in the activity. In all, some 21 species were reported and some 1920 individuals came under observation. The report was published in both *The Canadian Field-Naturalist* and *Bird-Lore*.

**INTERNATIONAL COMMITTEE FOR THE PROTECTION OF BIRDS OF THE WORLD.**—Mr. Hoyes Lloyd continues to be vice-chairman of the world committee. The work of the world committee however, has been greatly interrupted by the war. No formal activities or elections are being carried on though members of the world committee continue to maintain contact and interest against the time of renewal of organized activities. Mr. Lloyd and Dr. H. F. Lewis are continuing as our representatives in the interval.

**MEMBERSHIP COMMITTEE.**—The supply of membership forms was renewed during the year. Although no active membership campaign was conducted the treasurer reports that 32 new members joined the Club during the period of report.

The Council of the Club has greatly appreciated the support of the members in the various activities of the Club and hope that the lectures and excursions, etc., have made a positive contribution both to science and to the study of nature.

C. R. LOUNSBURY,  
*Secretary.*

# STATEMENT OF FINANCIAL STANDING OTTAWA FIELD-NATURALISTS' CLUB, DECEMBER 8, 1941

## CURRENT ACCOUNT

ASSETS		LIABILITIES	
Balance in Bank, December 8, 1941...	\$ 13.29	Reserve Fund.....	\$ 15.02
Bills receivable.....	122.50	Balance.....	120.77
	<u>\$135.79</u>		<u>135.79</u>
RECEIPTS		EXPENDITURES	
Balance in Bank, December 10, 1940	\$ 69.94	Canadian Field-Naturalist.....	\$ 973.65
Fees—Current.....	629.92	Editor.....	50.00
“ —Advance and Arrears.....	102.00	Separates and Illustrations.....	321.65
Separates and Illustrations.....	248.60	Postage and Stationery.....	43.90
Single and back numbers.....	330.13	Miscellaneous.....	17.03
Miscellaneous.....	58.57	Bank discount.....	19.64
Interest—Reserve Fund.....	57.00	Partial Repayment of Loan—Reserve	
Interest—Publication Fund.....	42.50	Fund.....	99.50
		Balance in Bank, December 8, 1941..	13.29
	<u>\$1538.66</u>		<u>\$1538.66</u>

## RESERVE FUND

ASSETS		LIABILITIES	
Canadian Government Bonds.....	\$1300.00	NIL—	
Bills Receivable.....	15.02		
Balance in Bank, December 8, 1941 ..	200.99		
	<u>\$1516.01</u>		
RECEIPTS		EXPENDITURES	
Balance on Hand, December 6, 1940 .	\$ 200.47	Canadian Government Bond.....	\$ 100.66
Bond Interest.....	57.00	Bond Interest to Current Account...	57.00
Bank Interest.....	1.68	Balance in Bank, December, 8 1941	200.99
Partial Repayment of Loan—Current			
Account.....	99.50		
	<u>\$358.65</u>		<u>\$358.65</u>

## PUBLICATION FUND

ASSETS		LIABILITIES	
Canadian Government Bonds.....	\$1000.00	NIL—	
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	<u>\$1072.40</u>		
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Balance in Bank, December 6, 1940...	\$172.20	Canadian Government Bond.....	100.65
Bond Interest.....	42.50	Bond Int. to Current Account.....	42.50
Bank Interest.....	.85	Balance in Bank, December 8, 1941....	72.40
	<u>\$215.55</u>		<u>\$215.55</u>

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ISSUED MARCH 28th, 1942

*Entered at the Ottawa Post Office as second-class matter*

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## CONTENTS

	PAGE
Amphibians and Reptiles of Canada. By E. B. S. Logier and G. C. Toner .....	15
The Snowshoe Rabbit Enquiry, 1939-40. By Dennis Chitty and Helen Chitty .....	17
Birds of Leeds County, Ontario (Continued). By G. C. Toner, W. E. Edwards and Murray W. Curtis .....	21
Book Reviews:—	
About Ourselves. By A.W.A.B. ....	24
The Microbe's Challenge. By C.K.J. ....	25
Christmas Bird Census, 1941.....	26

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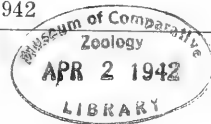
# The Canadian Field-Naturalist

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No. 2

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## AMPHIBIANS AND REPTILES OF CANADA

By E. B. S. LOGIER and G. C. TONER

Royal Ontario Museum of Zoology

HERPETOLOGICAL studies in Canada have never received the attention they deserve. Most of the naturalists of the country were not concerned with these forms, though there are some important exceptions, as a review of the literature shows. Many of the older lists by Canadians are outmoded in nomenclature and distribution; many of the lists by Americans just say Canada for the range of a species north of the border. Again, there are important exceptions that will readily occur to the herpetologist.

The authors of this paper have in hand a check list and distributional study of all amphibians and reptiles in Alaska, Canada and Newfoundland. The present contribution is a preliminary list of 93 forms found in this region, based on records from the literature and specimens in the Royal Ontario Museum of Zoology at Toronto. It is published for the information of herpetologists and in the hope of securing additional records or other material that will be of value.

Particularly needed are notes and distributional information from Quebec, the Maritime Provinces and the Prairies. Even more important is the securing of preserved material from these regions, in order that the ranges of the various subspecies may be worked out. Even the commonest species are needed, and naturalists throughout Canada can contribute considerably to the check-list by sending to the Royal Ontario Museum of Zoology some specimens from the regions in which they live. Due acknowledgement will be made for all information or specimens received.

### SALAMANDERS

*Necturus maculosus*. Mudpuppy.

*Triturus torosus torosus*. Pacific Newt.

*Triturus viridescens viridescens*. Green Newt.  
*Dicamptodon ensatus*. Pacific Giant Salamander.

*Ambystoma decortcatum*. British Columbia Salamander.

*Ambystoma gracile*. Northwestern Salamander.  
*Ambystoma jeffersonianum*. Jefferson's Salamander.

*Ambystoma macrodactylum*. Painted Salamander.

*Ambystoma maculatum*. Spotted Salamander.  
*Ambystoma tigrinum tigrinum*. Tiger Salamander.

*Ambystoma tigrinum diaboli*.  
*Ambystoma tigrinum slateri*.  
*Plethodon cinereus*. Red-backed Salamander.  
*Plethodon vehiculum*. Western redbacked Salamander.

*Desmognathus fuscus fuscus*. Dusky Salamander.  
*Desmognathus ochrophaeus ochrophaeus*. Mountain Salamander.

*Ensatina eschscholtzii*. Red Salamander.  
*Hemidactylum scutatum*. Four-toed Salamander.

*Aneides ferreus*. Clouded Salamander.  
*Eurycea bislineata bislineata*. Two-lined Salamander.  
*Eurycea bislineata major*.—Gaspé Salamander.

### TOADS AND FROGS

*Ascaphus truei*. American Ribbed Toad.  
*Scaphiopus hammondi*. Western Spadefoot Toad.

*Bufo americanus americanus*. American Toad.  
*Bufo americanus copei*. Hudson Bay Toad.  
*Bufo boreas boreas*. Northwestern Toad.  
*Bufo cognatus*. Great Plains Toad.  
*Bufo fowleri*. Fowler's Toad.

*Bufo hemiophrys*. Canadian Toad.  
*Acris crepitans*. Cricket Frog.  
*Pseudacris nigrila septentrionalis*. Northern Swamp Tree Frog.  
*Pseudacris nigrila triseriata*. Swamp Tree Frog.  
*Hyla crucifer*. Spring Peeper.  
*Hyla regilla*. Pacific Tree Frog.  
*Hyla versicolor versicolor*. Varying Tree Toad  
*Rana aurora aurora*. Oregon Red-legged Frog.  
*Rana catesbeiana*. Bullfrog.  
*Rana clamitans*. Green Frog.  
*Rana palustris*. Pickerel Frog.  
*Rana pipiens*. Leopard Frog.  
*Rana brachycephala*. (Probably only a sub-species of *pipiens*).  
*Rana pretiosa pretiosa*. Western Spotted Frog.  
*Rana septentrionalis*. Mink Frog.  
*Rana sylvatica sylvatica*. Wood Frog.  
*Rana sylvatica cantabrigensis*. Northern Wood Frog.  
*Rana sylvatica latiremis*. (Western Wood Frog?)

## LIZARDS

*Sceloporus occidentalis occidentalis*. Pacific Swift.  
*Phrynosoma douglassii douglassii*. Douglass's Horned Lizard.  
*Gerrhonotus coeruleus principis*. Northern Plated Lizard.  
*Eumeces fasciatus*. Blue-tailed Skink.  
*Eumeces septentrionalis septentrionalis*. Northern Skink.  
*Eumeces skiltonianus skiltonianus*. Skilton's Skink.

## SNAKES

*Charina bottae*. Rubber Boa.  
*Diadophis punctatus edwardsii*. Eastern Ring-necked Snake.  
*Heterodon contortrix*. Hog-nosed Snake.  
*Heterodon nasicus*. Western Hog-nosed Snake.  
*Opheodrys vernalis*. Smooth Green Snake.  
*Coluber constrictor constrictor*. Black Racer  
*Coluber constrictor flaviventris*. Blue Racer.  
*Coluber constrictor mormon*. Western Blue Racer.  
*Elaphe obsoleta obsoleta*. Pilot Black Snake.  
*Elaphe vulpina gloydi*. Eastern Fox Snake.  
*Pituophis catenifer catenifer*. Pacific Gopher Snake.

*Pituophis sayi sayi*. Say's Gopher Snake.  
*Lampropeltis triangulum triangulum*. Milk Snake.  
*Natrix septemvittata*. Queen Snake.  
*Natrix sipedon sipedon*. Northern Water Snake.  
*Natrix sipedon insularum*. Island Water Snake.  
*Storeria dekayi*. Dekay's Snake.  
*Storeria occipitomaculata*. Red-bellied Snake.  
*Thamnophis butleri*. Butler's Garter-snake.  
*Thamnophis ordinoides ordinoides*. Puget Garter-snake.  
*Thamnophis ordinoides elegans*.  
*Thamnophis ordinoides vagrans*. Gray Garter-Snake.  
*Thamnophis radix*. Plains Garter-Snake.  
*Thamnophis sauritus sauritus*. Ribbon Snake.  
*Thamnophis sirtalis sirtalis*. Eastern Garter-Snake.  
*Thamnophis sirtalis concinnus*. Red-spotted Garter Snake.  
*Thamnophis sirtalis parietalis*. Red-barred Garter Snake.  
*Sistrurus catenatus catenatus*. Massasauga.  
*Crotalus horridus horridus*. Timber Rattlesnake.  
*Crotalus viridis viridis*. Prairie Rattlesnake.  
*Crotalus viridis oreganus*. Pacific Rattlesnake.

## TURTLES

*Sternotherus odoratus*. Musk Turtle.  
*Chelydra serpentina*. Snapping Turtle.  
*Clemmys guttata*. Spotted Turtle.  
*Clemmys insculpta*. Wood Turtle.  
*Clemmys marmorata*. Western Pond Turtle.  
*Emys blandingii*. Blanding's Turtle.  
*Graptemys geographica*. Map Turtle.  
*Chrysemys bellii bellii*. Bell's Painted Turtle.  
*Chrysemys bellii marginata*. Western Painted Turtle.  
*Chrysemys picta picta*. Eastern Painted Turtle.  
*\*Caretta caretta*. Loggerhead Turtle.  
*Dermochelys coriacea*. Atlantic Leatherback Turtle.  
*Dermochelys schlegelii*. Pacific Leatherback Turtle.  
*Amyda spinifera spinifera*. Spiny Soft-shelled Turtle.

\* Record furnished by C. L. Patch.

## THE SNOWSHOE RABBIT ENQUIRY, 1939-40

By DENNIS CHITTY and HELEN CHITTY

*Bureau of Animal Population, Oxford, England*

## GENERAL INTRODUCTION

THE SNOWSHOE RABBIT or varying hare (*Lepus americanus*) fluctuates between extremes of scarcity and abundance. Years in which its numbers are highest do not occur simultaneously throughout the animal's range and in some parts the rabbit populations apparently do not fluctuate at all. There have generally been about 10 years between each peak of abundance, but it is not known how constant this periodicity is in different parts of the country. Information on year to year changes in numbers has been collected from several hundred observers in Canada, U.S.A. and Alaska and summarized in this and eight previous reports<sup>1</sup>.

During 1939-40 there was, on the whole, a continued but unspectacular recovery from the low numbers following the last peaks, which occurred in different regions over a period of six years between 1932 and 1938. Except from Nova Scotia, New Brunswick and limited areas in the Prairie Provinces, there were few reports of great abundance of rabbits during 1939-40, showing that several more years of increase were to be expected.

## CANADA

The last snowshoe rabbits to be affected by the widespread mortality which began in 1932-33 were those in the Yukon: for as late as 1936-37 some increase and abundance were reported. Then followed two years of decrease and scarcity from which the first slight signs of recovery became apparent in 1939-40. However this was the second year of recovery in the Northwest Territories and Northern British Columbia and the third or fourth in the northern half of Alberta and Saskatchewan. It was chiefly from the latter two provinces that reports of epidemic were first received (1932-33) and in which decrease had become most widespread by the following year. Two more years of decrease and scarcity passed before 1936-37, when the cycle of abundance again started slowly upwards. In southern British Columbia and among the scattered rabbit populations of southern Alberta and Saskatchewan little change was shown.

In Manitoba recovery was at least one year

behind Alberta and Saskatchewan, but numbers increased throughout 1938-40 and in the last year there were even reports of quite high abundance. Across central Ontario there was a definite check in 1938-39 to the recovery of the year before and in 1939-40 there was relatively little change. In northern Ontario there was a long period of rabbit scarcity from 1934-39 and the present reports are the first to show that any general increase had started. Between Lake Huron and the Ottawa River not many rabbits were to be seen, although increase had been reported since at least 1937. In Quebec increase did not become much more general in 1939-40 than in the previous year, though the gain over 1937-38 was maintained. Rabbits in the Maritime Provinces appear to have reached a greater abundance in 1939-40 than elsewhere in North America, and although in both New Brunswick and Nova Scotia there were more reports of decrease and no change than during the previous year, there was no evidence of the approach of any general decline.

*Numbers seen.* The National Parks enquiry form asks for an example of numbers seen or shot, but replies are hard to analyse because they are not given in a standard way as they are for comparative abundance. Examples, not necessarily typical, have been selected to show the greatest abundance reported from various parts of Canada.

## BRITISH COLUMBIA

*Merritt:* "November to January, in swamps, six might be seen in an afternoon." (R. R. Garnet.)

## ALBERTA

*Townships 89-93, Ranges 22-4 West of 5th Meridian.* "Approximately 40 seen on one round trip of 37 miles, 18 May."

*Tps. 77-8, R. 24-5 W-5th.* "Between 15 November and 25 March about 2,000 rabbits were shot in these townships." (G. Powers.)

*Tps. 50-1, R. 21 W-4th.* "On 7 May from 5.00 to 6.45 p.m. counted 52 in about 5 miles." (F. Williams.)

## SASKATCHEWAN

*Tps. 68-74, R. 8-16 W-3rd.* "Local natives snaring all they require at present time." (F. W. Redhead.)

*Tps. 53-6, R. 3-4 W-3rd.* "In April and May,

1. *The Canadian Field-Naturalist*, 47: 63-69, 84-86, 1933; 48: 73-78, 1934; 49: 79-85, 1935; 50: 71-81, 1936; 51: 63-73, 1937; 52: 63-72, 1938; 53: 63-70, 1939; 54: 117-24, 1940.

TABLE I.

*Reports for 1939-40 about changes in abundance of snowshoe rabbits in Canada compared with 1938-39 (each year ending 31 May).*

	No. OF OBSERVERS				% OF OBSERVERS		
	Increase	Decrease	No Change	Total	Increase	Decrease	No Change
Yukon.....	4	2	0	6	67	33	0
Northwest Territories.	18	0	2	20	90	0	10
British Columbia.....	21	1	21	43	49	2	49
Alberta .....	52	4	23	79	66	5	29
Saskatchewan .....	63	2	12	77	82	2	16
Manitoba .....	45	5	10	60	75	8	17
Ontario .....	41	13	23	77	53	17	30
Quebec and Labrador .....	30	13	7	50	60	26	14
New Brunswick .....	11	3	8	22	50	14	36
Nova Scotia .....	26	7	8	41	63	17	2
Total .....	331	50	50	475	66	10	24

1939, one or two rabbits per day were seen. In April and May, 1940, I have seen as high as 20 in a day." (E. L. Millard.)

*Tps. 44, R. 30 W-1st.* "As many as 100 seen in a single day around the first part of May." (F. Langford.)

MANITOBA

*Gillam.* "During March could be snared at the rate of 20 a night." (J. D. Lee.)

*Norway House.* "From November to April have seen rabbits by the hundreds along portages, lake and river shores, and in December at one camp saw 100 snared rabbits. The Indians had plenty to eat last winter." (P. W. Durant.)

*Brandon.* "In the Brandon Hills as many as 100 have been shot in an afternoon by three boys. Very abundant and doing much damage in the Turtle Mountains." (R. D. Bird.)

ONTARIO

*Rainy River.* "One to twelve seen on each patrol from Rainy River to Morson [over 30 miles]." (W. A. Horley.)

*Fort William.* "Increase spotty: some areas no increase, but in one small area 20 rabbits were shot in two days." (C. L. Perrie.)

*Schreiber.* "About 10 seen in each month December to February." (H. E. Deedo.)

*Sault Ste Marie.* "Six shot by two hunters, Nov. 6th; four shot by three hunters, Nov. 21st." (C. F. Cook.)

*Cochrane.* "Three or four seen in one day." (L. A. Dent.)

*Muskoka-Ontario Counties.* "Biggest bag I have seen was a hunter with three in December." (A. E. Pennell.)

*East of Algonquin Park.* "During May I saw

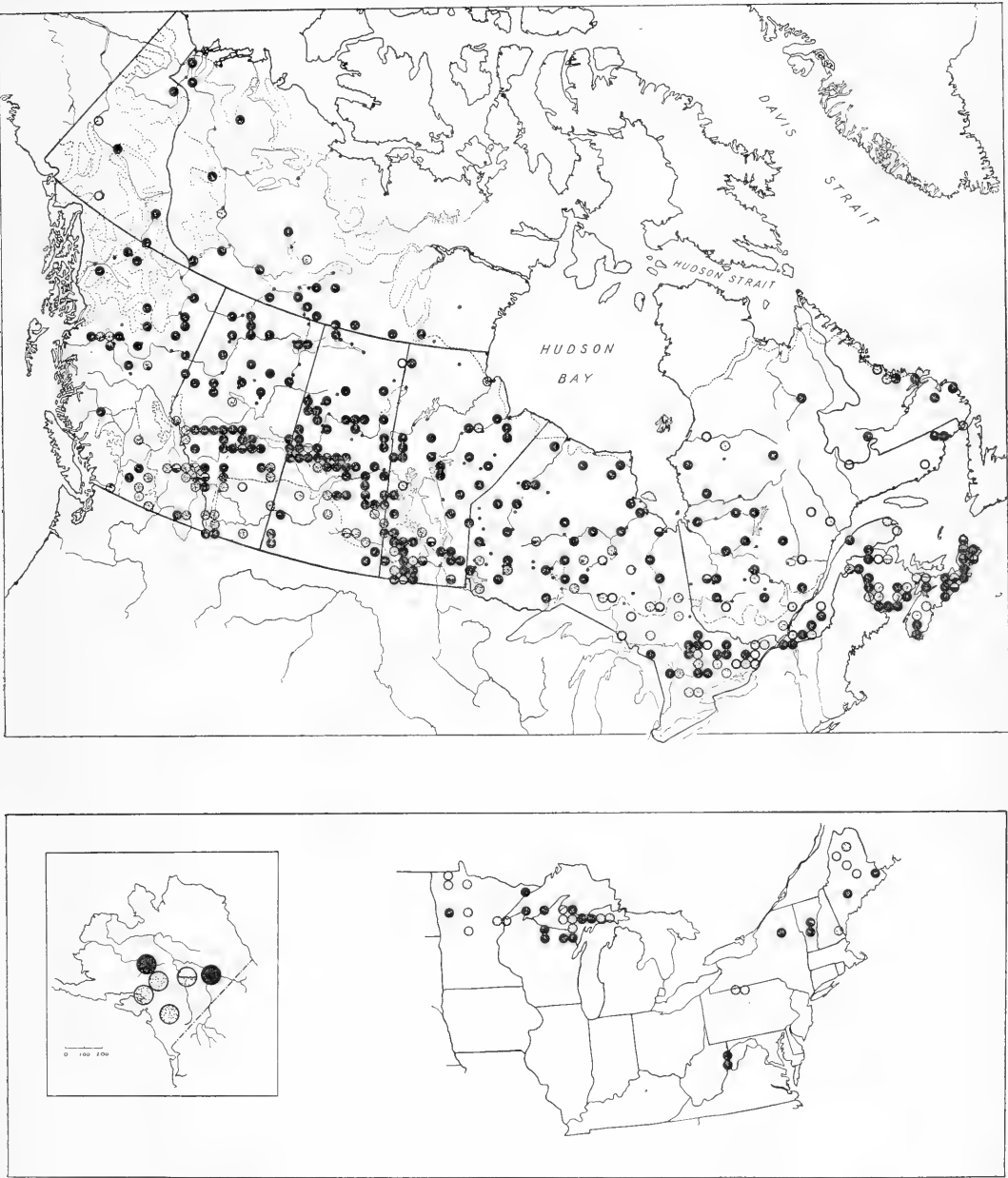


Fig. I. Reports for 1939-40 about changes in abundance of snowshoe rabbits compared with 1938-39. Each circle of 30 miles diameter (100 miles in Alaska) marks the approximate centre of stretch of country reported on by one or more observers. (*Canadian Field-Naturalist* 54: 117). INCREASE reports are shown black, DECREASE white, NO CHANGE stippled. Where reports at the same centre disagree the circle is divided up in proportion to the number of opinions of each kind.



TABLE II.

*Reports for 1939-40 about changes in abundance of snowshoe rabbits in U.S.A.  
(L. americanus only) compared with 1938-39 (each year ending 31 May).*

State	1939-40			
	Increase	Decrease	No Change	Total
Maine .....	2	3	1	6
Michigan.....	4	1	5	10
Minnesota.....	2	1	5	8
New Hampshire.....	0	0	1	1
New York.....	2	0	0	2
Pennsylvania.....	0	0	2	2
Vermont.....	3	0	0	3
West Virginia.....	2	0	0	2
Wisconsin.....	6	1	0	7
Total.....	21	6	14	41
Percentage.....	51	15	34	

perhaps 200 while driving back roads." (M. J. Inwood.)

*Victoria Co.* "I saw 11 in 2 miles alongside a bush road last month [? May]." (A. M. Hodgson.)

*Frontenac Co.* "Not more than a dozen seen all winter." (C. W. Bishop.)

#### QUEBEC

*Chicoutimi Co.* "Five or six seen per day." (D. Wyber.)

*Quebec Co.* "A truck brought at least 75 pairs into the Champlain market in Quebec City and the butchers have had more than they can sell." (D. Fleury.)

*Champlain Co.* "Members of a club in Grand' Mère killed about 200 last season." (J. G. L. Gosselin.)

*Stanstead Co.* "About 200 killed in Stanstead County 1 September to 15 January." (E. Theriault.)

#### NEW BRUNSWICK

*York Co.* "Hundreds were shipped alive to U.S.A. last season." (K. Dorcas.)

*St. John Co.* "In the three days 9-11 January two men snared 212 back of Grand Bay." (E. Hayes.)

#### NOVA SCOTIA

*Yarmouth Co.* "Fur farmers have been buying rabbits the past three winters, and in cold storage for fox and mink food there were 2,903 lbs. at the end of March, 1940: 200-300 lbs. more than last year." (C. C. Burrell.)

*Victoria Co.* "Some fellows got as high as 25 a day around Dec. 1st." (P. Matheson.)

*Richmond Co.* "Another chap and I shot 28 in a couple of hours last fall. Hundreds were sold for food around Sydney." (N. G. Mackenzie.)

#### UNITED STATES

In *Minnesota* rabbits were still scarce and had changed very little during 1939-40. Dr. R. G. Green reports that there were 74 per square mile during 1940 compared with 73 in 1939 and 32 when they were at their lowest in 1938. In *Wisconsin*, recovery, though patchy, seems to have been the most definite of any state. Mr. W. E. Scott of the Wisconsin Conservation Department

states that according to wardens' reports in February, 1940, increase had occurred in 15 out of 30 counties, no change in 12 and decrease in 3. The 1939 hunters' kill is given as 110,953 compared with 83,905 in 1938. Mr. D. W. Mather says that in the Nicolet National Forest: "it is estimated that the population doubled . . . banding indicated a population of 82 snowshoe hares per square mile." In the Upper Peninsula, Michigan, numbers were still fairly low and not showing any universal increase. In the states further east recovery had, on the whole, continued, but with some indication of a check in parts of Maine.

#### ALASKA

In some places in Alaska rabbits remained abundant even later than they did in the Yukon, and apparently a peak occurred as recently as 1937-38 at Copper Centre. In 1939-40 there was great scarcity with little evidence of recovery. Mr. Otto M. Geist, Fairbanks, writes: "At places where formerly rabbits were thought inexhaustible not a single one can be seen. In places where a few were observed last spring (1939) not one can be seen . . . one a week is a good figure of observing."

#### ACKNOWLEDGEMENTS

The Canadian data are 503 replies to questionnaires sent out by the National Parks Bureau, Ottawa, and the Hudson's Bay Company, Winnipeg. Again we thank Mr. Hoyes Lloyd and Mr. R. H. G. Bonnycastle who collected the information and also those who supplied it: 124 men in the Royal Canadian Mounted Police, 123 provincial game wardens, 62 wardens in the National Parks, 159 men in the Hudson's Bay Company and 35 others. 41 reports from the United States and seven from Alaska were kindly supplied through Dr. H. H. T. Jackson of the U.S. Fish and Wildlife Service, Washington, D.C. The work in Oxford has been carried on with the aid of grants from the Carnegie Corporation of New York (administered through the Carnegie Institution of Washington), and the Hudson's Bay Company.

#### SUMMARY

551 observers in Canada, U.S.A. and Alaska reported about changes in the numbers of snowshoe rabbits in 1939-40 compared with the previous 12 months. Recovery from the bottom of the latest ten-year cycle was proceeding rather slowly in most areas but in others rabbits had already become noticeably abundant.

## BIRDS OF LEEDS COUNTY, ONTARIO

By G. C. TONER, W. E. EDWARDS and MURRAY W. CURTIS

(Continued from page 12)

MALLARD. *Anas platyrhynchos*.—The mallard is a common migrant, but there seem to be few definite records from the county. The local hunters refer to female mallards as "grey ducks".

Brockville: W. J. Miller states that he has seen this duck on the river. (G.C.T.)

Gananoque Lake: I examined a specimen shot by a hunter on October 27, 1938. (G.C.T.)

Lyndhurst: W. J. Miller states that he shot a female, October 1, 1938, and examined a pair shot in November, 1938. (G.C.T.)

Wiltsie Lake: I shot a male mallard in November, 1926. (M.W.C.)

BLACK DUCK. *Anas rubripes*.—There may be some differences between the black ducks found in this region, many of the guides and hunters recognizing that the local breeding population differs from the late fall migrants. These late migrants have red legs and are larger in size. Mr. Taverner, commenting on this supposed

variety, says that most investigators are inclined to believe that the red-legged black ducks are the old mature adults that have lingered in the north until full breeding colours have been assumed. R. G. Sheppard, Game Overseer, tells us of seeing hundreds of the red-legged variety in buckwheat fields north of Brockville in late November and early December, 1937.

Brockville: Young found the black duck breeding about 15 miles north of the town. (18)

Belabourer Island: Nest with 11 eggs found May 1, 1938. This nest was later deserted. (G.C.T.)

Delta: C. L. Broley found a nest with ten eggs on June 14, 1932. (2)

Lyndhurst: W. J. Miller examined 7 black ducks shot on October 1, 1938. (G.C.T.)

South Lake: A pair noted on June 15, 1937. (G.C.T.)

GADWALL. *Chaulelasmus streperus*.—The gadwall is an uncommon migrant, occasionally appearing in the bags of the hunters.

Gananoque Lake: I examined a male gadwall, shot October 15, 1937, but was unable to secure it as a specimen. (G.C.T.)

Lyndhurst: W. J. Miller noted a flock of ten on October 16, 1937, on the creek above the village. He states that they are known to the local hunters as "grey ducks." (G.C.T.)

BALDPATE. *Mareca americana*.—Like the gadwall, the baldpate is an uncommon migrant mainly noted in late October or early November.

Gananoque: I examined one shot on the River St. Lawrence in October, 1936 (G.C.T.)

AMERICAN PINTAIL. *Dafla acuta*.—The pintail appears in this county during spring and fall migration, often being noted in the great flocks of ducks that are on the St. Lawrence in late March or early April.

Lake Elolida: On October 31, 1938, pintails were common and one was collected, now in the R.O.M.Z. (M.W.C.)

GREEN-WINGED TEAL. *Nettion carolinense*.—The green-winged teal is a common migrant that is often taken by the hunters in the early part of the open season.

Gananoque Lake: On October 17, 1937, I examined five of these teal that had been shot at the north end of the lake. (G.C.T.)

Lake Elolida: I shot one here on October 3, 1938. (M.W.C.)

Lyndhurst: W. J. Miller shot a drake green-wing in October, 1937. (G.C.T.)

BLUE-WINGED TEAL. *Querquedula discors*.—This teal is a common migrant and an occasional breeder though there are no recent, definite records of nests.

Gananoque Lake: Young recorded a nest from this lake without giving any data. (18). I noted two males in breeding plumage, May 9, 1935. (G.C.T.)

Lake Elolida: A specimen secured for the R.O.M.Z. on October 3, 1938. (M.W.C.)

Lyndhurst: From W. J. Miller's notes; "The number of blue-winged teal seen in 1938 was surprising. With only a few pair observed in the 1937 hunting season, today, October 1, 1938, forty-five of these birds were noted. Nine were secured, mostly from the creek above the village." (G.C.T.)

SHOVELLER. *Spatula clypeata*.—The shoveller is noted in this region only during its migrations.

Gananoque: A specimen, shot November 30, 1936, is now in the R.O.M.Z. (G.C.T.)

WOOD DUCK. *Aix sponsa*.—These ducks have increased greatly in the past decade. They can be found on nearly every lake in the county during spring and early summer. Though protected, many are shot during the duck season by novice hunters who cannot recognize them unless they are in the hand.

Gananoque: A banded bird was shot in the fall of 1934 and reported to Ottawa. (25)

Leeder's Creek: Reported as breeding here in 1937 and in 1938. (G.C.T.)

Lyndhurst Lake: W. J. Miller reports them as common in 1937 and 1938. (G.C.T.)

Tremont Park Island: For several years before 1938 a pair nested in a keg set in a tree. (G.C.T.)

REDHEAD. *Nyroca americana*.—The redhead is a very uncommon migrant that at one time was much more common than it is at present. There is some evidence, however, that the species is recovering its numbers.

Charleston Lake: In one of the hotels at Charleston village there is a mounted specimen taken many years ago on the lake. (G.C.T.)

Willowbank Creek: Two redheads were shot on November 12, 1938. (G.C.T.)

RING-NECKED DUCK. *Nyroca collaris*.—The ring-necked duck seems to be increasing. Mendall (20) reported the species as extending its breeding range to the east; this may explain the many reports received in 1938 and in 1939 from the hunters who stated that on the Rideau Lakes, during the opening days of the duck season, "ring-neck scaup" were comparatively abundant.

CANVASBACK. *Nyroca valisneria*.—The canvasback is seldom noted at the present time but formerly it was quite abundant on the St. Lawrence during the fall migration.

Black Ant Island: A flock of four were reported on November 30, 1938; of these one was shot. (G.C.T.)

GREATER SCAUP. *Nyroca marila*.—This duck is known throughout the country as the broadbill, or bluebill, and few hunters differentiate between it and the lesser scaup. Mr. Taverner suggests that the species may arrive earlier in spring and remain later in fall than does the smaller scaup.

Gananoque: As the ice leaves the St. Lawrence in the spring immense numbers of scaup, together with other species, throng the open waters. I estimated that there were 10,000 birds in one flock, ninety-nine per cent scaup, seen on March 17, 1938. (G.C.T.)

Rockport: A greater scaup, banded by A. A. Allen, at Cayuga, late in March, 1922, was killed April, 1924, 25 miles above Ogdensburg. (near Rockport). (Can. Field-Nat. XXXIX, 1925:18.)

LESSER SCAUP. *Nyroca affinis*.—The two species of scaup are almost impossible to distinguish in the field, and unless one has specimens in the hand it is wiser not to attempt identification. A local wildfowler, who knows of the difference in size, states that the scaup are present in equal numbers during the open season.

Lyndhurst Creek: W. J. Miller reports shooting a lesser scaup in October, 1937. (G.C.T.)

Chimney Island: A lesser scaup, banded May, 1939, at Pymatuning lake, Ohio, was shot on October 16, 1939, by D'Arcy Imrie of Brockville. (G.C.T.)

AMERICAN GOLDEN-EYE. *Glaucionetta clangula*.—The "whistlers" are the last ducks to depart in the fall and the first to arrive in the spring. Where there is open water they will often remain all winter. They are quite common during the open season.

Gananoque: A young drake remained from December, 1937, till March, 1938, on the mill-pond in the town. (G.C.T.)

Lake Elolida: A drake shot on November 2, 1938, is now in the R.O.M.Z. (G.C.T.)

BUFFLEHEAD. *Charitonetta albeola*.—The bufflehead is an uncommon migrant that is sometimes taken by the hunters during the open season.

Brockville: W. J. Miller examined a specimen shot on the River St. Lawrence, November 26, 1928 (G.C.T.)

OLD-SQUAW. *Clangula hiemalis*.—There are a number of sight records for this species, and the hunters report it as common on the St. Lawrence river.

Brockville: W. J. Miller examined five shot October 28, 1933, on the St. Lawrence River. (G.C.T.)

Huckleberry Island: A pair of old-squaws shot on November 5, 1938. (G.C.T.)

Lake Elolida: On October 3, 1938, one was shot but not preserved. (M.W.C.)

KING EIDER. *Somateria spectabilis*.—The king eider is a casual visitor to this region, following the St. Lawrence from its normal haunts along the Atlantic coast. All the birds that have been noted here have been in immature plumage.

Ivy Lea: Young reported a king eider shot in December, 1898. (30)

Landon's Bay: Several were shot about November 20, 1936, and I secured one for the R.O.M.Z. (G.C.T.)

WHITE-WINGED SCOTER. *Melanitta deglandi*.—The white-winged scoter may be of regular occurrence along the St. Lawrence and on the inland lakes, as the hunters report them each year.

Black Ant Island: A scoter, of this species, shot here on November 30, 1938. (G.C.T.)

Westport: Two were shot, October 12, 1938, on Wolfe Lake, and the heads, wings and feet sent to the R.O.M.Z. (G.C.T.)

HOODED MERGANSER. *Lophodytes cucullatus*.—This merganser is mainly noted as a spring and fall migrant. It is possible that it may breed near the more isolated lakes.

Bateau Channel: Specimen in the R.O.M.Z., taken October 19, 1938. (G.C.T.)

Green Lake: One noted here in November, 1938. (M.W.C.)

AMERICAN MERGANSER. *Mergus merganser*.—The common merganser, known locally as the "Cream Belly", arrives late in the fall and often remains throughout the winter if there is open water. Some of these may remain to breed in this vicinity. E. Beaupre, in his diary, mentions that Mr. Young brought him an egg, collected about July 1, 1896, on Grassy Island, from a nest containing eight eggs. The locality name is not definite, but the island is probably one of the Thousand Islands of the St. Lawrence.

Grog Island: Specimen in the R.O.M.Z., taken November 30, 1938. (G.C.T.)

Lyndhurst: In the winter of 1933-34 these birds were common, as there was open water on Lyndhurst creek. It was amusing to watch them flying along above the ice, then suddenly disappearing into a hole only a foot or so in diameter. After a short absence from sight they would reappear with some small fish or crustacean, take a short "breather", and resume their under-water-ice fishing. (M.W.C.)

Newboro: The stomach contents of two mergansers, taken November 30, 1938, in Newboro Lake, were identified by Prof. Dymond, R.O.M.Z. No. 1 contained six sunfish, *Lepomis gibbosus*. No. 2 contained twenty darters, *Poeciliichthys exilis*, and three sunfish, *L. gibbosus*. (G.C.T.)

RED-BREASTED MERGANSER. *Mergus serrator*.—These mergansers are very common in the spring and fall, and it is possible that some of them remain to breed within our limits. Young (18) stated that at one time they were frequently found breeding along the St. Lawrence but only a few pair remained (circa 1900).

Brockville: About 14 miles above Brockville, (Mallorytown Landing) a flock of upwards of 20 noted by Young in June, 1893. (18)

Bateau Channel: Specimen in the R.O.M.Z., taken October 12, 1938. (G.C.T.)

Charleston Lake: Young stated that red-breasted mergansers nested on this lake when he was resident in the county. (32)

AMERICAN GOSHAWK. *Astur atricapillus*.—Goshawks occasionally invade southern Ontario in winter. The last big migration was in 1935, and many were shot throughout the region by hunters and others.

Athens: Goshawks have been noted on the following dates: January 24, 1927; March 26, 1927. Two specimens in the R.O.M.Z. were taken November 22, 1938 (M.W.C.)

Gananoque: N. de St. Remy collected a goshawk on November 19, 1935, now in the R.O.M.Z. (G.C.T.)

South Lake: A goshawk was noted April 24, 1938. (W.E.E.)

**SHARP-SHINNED HAWK.** *Accipiter velox*.—This hawk is rather uncommon in summer. It is noted frequently in spring and fall and it is possible that a few may breed in the county.

Brockville: From W. J. Miller's notes; "On December 29, 1925, I saw a sharp-shin strike and kill a pigeon east of the town. The victim was carried a short distance, partially eaten, and the remainder carried out of sight." (*G.C.T.*)

**COOPER'S HAWK.** *Accipiter cooperi*.—There is still much country suitable for this hawk in Leeds county. Deep, isolated woodlands are its habitat and as long as these remain it will not be exterminated.

Lansdowne: C. J. Young collected three eggs on June 1, 1895, now in the R.O.M.Z. (*G.C.T.*) Young found a nest with four eggs on May 9, but does not mention the year. (18).

Westport: Nest and young of Cooper's Hawk found August 1, 1934, by L. L. Snyder. (2)

**RED-TAILED HAWK.** *Buteo borealis*.—This hawk often falls victim to guns of the duck hunters while on its migration flights. Young (18) stated it was rare along the St. Lawrence.

Bateau Channel: The R.O.M.Z. has a young bird from here, shot on October 3, 1935. (*G.C.T.*)

Brockville: W. J. Miller has given me records of this species. (*G.C.T.*)

Gananoque: The following sight records are from my notes: March 11, 1927, and April 1, 1928. (*W.E.E.*)

**RED-SHOULDERED HAWK.** *Buteo lineatus*.—This is the common Buteo of the county. There are

many sight records and a fair number of breeding records. Young (18) stated it nested in several places in this region but failed to give localities.

Beverly Lakes: C. L. Broley notes that this is the only common hawk of the area. (*G.C.T.*)

Junetown: The R.O.M.Z. has a set of eggs collected May 4, 1900, by E. Beaupre. (*G.C.T.*)

Lansdowne: C. J. Young collected a set of two eggs near this village, on April 27, 1894, that are now in the R.O.M.Z. (*G.C.T.*)

South Lake: While driving over No. 32 Highway on July 1, 1937, I noted a dead pilot black snake. Coming back about an hour later I was just in time to see a large red-shouldered hawk lift the snake from the road and carry it away. (*G.C.T.*)

Yonge Township: C. J. Young collected a set of three eggs on April 27, 1901, now in the N.M.C. (*G.C.T.*)

**BROAD-WINGED HAWK.** *Buteo platypterus*.—This hawk is common in spring and fall but there are few summer records. Young (18) stated it was common along the St. Lawrence.

Lansdowne: Nest of the broad-wing found by Young in 1898. (32).

**GOLDEN EAGLE.** *Aquila chrysaetos*.—The golden eagle is rare, but at least one specimen is known from Leeds. Sometime in the 1920's a golden eagle was shot at McInch's Beach near Gananoque. The mounted bird was given to the local patrol of scouts and on their disbanding it was used as an attraction in a tourist information booth. A resident of one of the Islands has the mount at the present time.

(To be continued)

## BOOK REVIEWS

**ABOUT OURSELVES.** By James G. Needham. Published, 1941, by the Jaques Cattell Press, Lancaster Pa., 276 pp., with illustrations by William D. Sargent; Price \$3.50.

This book is a token of the enterprise of a Press which honestly sets out to publish scientific works. The first of a series, it is printed on excellent paper, with a good font of type, and a good surface for taking line cuts. The only quarrel the reviewer has with the format is that the type has been set a little too close to the inner margin of the page; this might have been designed for marginal notes, but the paper used is of the wrong texture for this purpose. Typographical errors are almost non-existent.

Professor Needham has put into this work the philosophy of the true academic biologist. As

he says himself, "this book is an exposition of human nature, without any plans for its improvement". Drawing on the rich sources of animal behaviour, he leads the reader by easy and logical stages to an understanding of the behaviour of that most complex of all animals, Man. Although neither in the classical style of a Darwin, nor in the stimulating colloquial manner of a Lutz, nevertheless the thread of argument is carried through with great clarity and evident sincerity.

The first-half of the book examines "Man in his Biological Aspects". The headings for the first chapter,—The Unity of the Living World, Animal Characteristics of the Human Species, and Distinctive Human Characteristics,—will indicate the author's mode of approach, and how

he demolishes the mediaevalists' arguments at the very outset. Dr. Needham goes on to develop one of the plainest and most happily phrased expositions of emergent evolution hitherto written. It is a tribute to the author's skill that he can develop his thesis to its conclusion without declaring himself either materialist or animist.

The second half of this book proceeds to review "Society in its Biological Aspects". The high point of the work is reached in Chapter XIII, entitled "The Components of Social Behaviour", largely written around a brilliant diagram on page 166. The influence of Wm. T. Sumner, the author of "Folkways", can be vividly felt throughout this chapter. It is when the author goes on to consider War in its Biological Aspects, especially Chapter XVII, entitled "War (Continued)", that the level of argument shows a noticeable lapse. It is perhaps due to the fault of over-simplification that his arguments lead him to an attitude which recent events have made it impossible now to maintain, but many will feel that he has reached firmer ground in his conclusion that force can be met only by force—A.W.A.B.

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THE MICROBE'S CHALLENGE. *By Frederick Eber-son, Ph.D., M.D. Published, 1941, by the Jaques Cattell Press, Lancaster, Pa. 334 pp.; Price \$3.50.*

Following upon the discovery that micro-organisms are the cause of many diseases, the past half-century has witnessed a degree of progress in the control of infectious disease that is little short of astounding. Louis Pasteur once remarked that "It is within the power of man to cause all parasitic disease to disappear from the world", and many assume that it will not be long before science has made it possible to accomplish this task.

With this assumption Dr. Eberson is inclined to disagree. He asserts that the battle between man and microbe has barely begun, and that the microbe is fighting back quite effectively. This view is based upon the fact that, like all other living organisms, bacteria are highly adaptable

and are constantly evolving new types or strains to meet the changing conditions imposed upon them in the struggle for existence. Much emphasis is placed upon the well-known ability of many species to "dissociate" into virulent and non-virulent strains when grown in the laboratory. While non-virulent strains have been isolated from humans and animals,—due, the author believes, to the interaction between the bacterial cell and the opposing forces in the body—there is very little experimental evidence of the reverse process taking place. Nevertheless the possibility that variations in the characters of the parasite are of major importance in the spread of human infections is accepted by many epidemiologists.

While there is doubtless a need for caution against undue optimism concerning the outcome of the struggle against disease, it would seem that Dr. Eberson takes an unduly pessimistic view. A cursory examination of the death-rate curves for a variety of infectious diseases since the turn of the century suggests that man is likely to continue adding to the impressive gains already made. Wider application of existing knowledge, together with new discoveries, should result in further progress. Strangely enough, the author fails to make any mention of sulfanilamide and its numerous derivatives, several of which promise to be veritable "life-savers". Nor is much attention given to improved nutrition, better housing, and many other factors which fall under the heading of improved living conditions, all of which are recognized factors in increasing the resistance of the host.

To write a book on such a subject which will not be too technical for the average reader, yet not "talk down" to the point where accuracy and authenticity are sacrificed; which will avoid the "dry-as-dust" style of much scientific writing without resorting to the "jazz" style of certain popular science writers, is no light task. While the author has endeavoured to lighten the tone of the book by the occasional pun or catchy heading, it lacks the clarity and artistry of expression which characterize another recent book along the same lines—"Plague on Us", by Geddes Smith.—C.K.J.

## CHRISTMAS BIRD CENSUS, 1941

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WOLFVILLE, N.S.—December 29, 1941; 10.30 a.m. to 5.00 p.m. Overcast; a few light snow-squalls; temp. about 32° at start; ground practically bare of snow. Two observers, working together part of the time and sometimes separated. Distance covered, 68 miles by auto and about 8 on foot. Area covered entirely within Kings County. Black Duck, 12; American Golden-eye, 1; American Common Merganser, 3; Nova Scotia Ruffed Grouse, 4; European Gray Partridge, 3; Common Pheasant, 2; Great Black-backed Gull, 2; Herring Gull, 17; Snowy Owl, 1; Northern Barred Owl, 1; Short-eared Owl, 2; Northern Flicker, 2; Hairy Woodpecker, 1; Blue Jay, 45; Northern American Raven, 2; Eastern Crow, 114; Black-capped Chickadee, 20; Brown-headed Chickadee, 2; White-breasted Nuthatch, 2; Common Starling, 15; English Sparrow, 52; Canadian Pine Grosbeak, 19; Eastern Goldfinch, 6; Slate-coloured Junco, 3; Eastern Tree Sparrow, 11. Total, 25 species, 342 individuals.—R. W. TUFTS and JOHN ERSKINE.

MONTREAL, QUE.—(Mount Royal, Westmount, Côte St. Luc, Cartierville, St. Lawrence River and South Shore from Dorval to Longueuil).—December 21, 1941, 7.45 a.m. to 4.00 p.m. Sunshine, clear sky, bitter west wind, temp. -6° at start -3° at finish; 9 in. of snow on ground. 18 observers in 7 groups as follows: Party I, 3 observers, 4 hours, 30 miles by car, 1 mile on foot; Party II, 4 observers, 4 hours, 8 miles on foot; Party III, 1 observer, 5 hours, 10 miles on skis; Party IV, 2 observers, 3 hours, 6 miles on foot; Party V, 3 observers, 7 hours, 15 miles on foot; Party VI, 1 observer, 5 hours, 75 miles by car; Party VII, 4 observers, 6 hours, 8 miles by boat and on foot. Total miles afoot 34, on skis 10, by boat 2, by car 105; total hours afield 34. American Golden-eye, 213; American Common Merganser, 6; American Goshawk, 1; Iceland Gull, 2; Herring Gull, 9; Snowy Owl, 5; Hairy Woodpecker, 7; Downy Woodpecker, 10; Eastern Crow, 3; Black-capped Chickadee, 51; White-breasted Nuthatch, 5; Brown Creeper, 1; Cedar Waxwing, 10; Common Starling, c. 850; English Sparrow, c. 1150; Pine Grosbeak, c. 206; Common Redpoll, 122; Snow Bunting, 55. Total, 19 species, about 2717 individuals. Ruffed Grouse, American Screech Owl, Canada Jay, Evening Grosbeak seen within week.—P. C. and R. S. ABBOTT, J. ANGLIN, M. BOWER, J. A. DECARIE, J. D. FRY, B. GOLLOP, E. HALL, G. HIBBARD, H. A. C. JACKSON, J. G. M. LEMOINE, R. LEPINGWELL, E. MUNROE, R. OUTHET, B. ROB-

INSON, D. RYAN, D. SCOTT, V. C. WYNNE-EDWARDS, (*Prov. Quebec Society for the Protection of Birds*).

HUDSON HEIGHTS, QUEBEC (including Whitlock Federal Government Bird Sanctuary).—Fields and woods (including Whitlock golf course property) within 3 miles of the Masonic Temple Building, Hudson Heights, on the south side of Lac de Deux Montagnes, including about 1¼ miles of the lake shore.—December 28, 1941, 7.00 a.m. to 3.30 p.m. Cloudy; 1½ to 2 in. of snow on ground; lake frozen; wind southwest, light; temp. 20° at start, to 26°; 22° at return. Sixteen observers in 7 parties. Total hours afield, 34½ (21 by foot, 13½ by skis); total party miles, 75½ (59 by foot, 16½ by skis). Ruffed Grouse, 13 (+1 dead found beside railway telegraph pole); Hairy Woodpecker, 13 (includes 1 female caught by cat, brought to Ommanney by boy, died within ½ hour); Downy Woodpecker, 14; American Three-Toed Woodpecker, 1 (seen on dead spruce within 2 yards, so close that the 3 toes, the ladder back and yellow on head could be clearly observed — Puxley, Clarke); Canada Jay, 8 (+ 1 imm. found dead, frozen into snow); Blue Jay, 48; Black-capped Chickadee, 120; Acadian Chickadee, 3; White-breasted Nuthatch, 8; Brown Creeper, 6; Cedar Waxwing, 2; Common Starling, 6; Common Purple Finch, 7; Pine Grosbeak, 6; Common Redpoll, 82 (in five flocks); Pine Siskin, 60; American Goldfinch, 8; White-winged Crossbill, 18; Slate-coloured Junco, 5; Tree Sparrow, 14 (includes 4 at winter feeding station); Snow Bunting, 100 in flock. Total, 21 species; 542 individuals. Note: very fresh workings of Pileated Woodpecker seen. Seen during the past week, Evening Grosbeak. Conditions were bad for bird observation and birds were very inactive. The American Three-Toed Woodpecker is a first record for the district.—MRS. R. L. PUXLEY, MRS. D. L. MACAULAY, MRS. P. B. BUCKLEY, MAJOR and MRS. GEORGE RILEY, MR. and MRS. ARTHUR HILL, MR. and MRS. E. D. CROLL, MISS AMY CLARKE, MR. BRUCE LANCEY, MR. G. G. OMMANNEY; all of Hudson Heights; MISS PAT SUGRUE, MR. DUNBAR MULLAN; both of Hudson; MISS JEAN BONNARD, of Como; MISS BOWER, of Montreal.

OTTAWA, ONT. (radially about city).—December 21, 1941; 7.15 a.m. to 4.30 p.m. Sky cloudless; 9 in. snow; wind light, west to northwest; temp. -8.5° at 8.00 a.m., +3.5° at 2.00 p.m. 20 observers in 9 parties. Total party hours on foot,



49; by car, 2; total party miles on foot, 74; by car, 20. Black Duck, 1; American Golden-eye, 69; American Common Merganser, 10; Ruffed Grouse, 10; Common Pheasant, 4; Herring Gull, 1; American Screech Owl, 1; Hairy Woodpecker, 7; Downy Woodpecker, 22; American Three-toed Woodpecker, 1 (ladder back and other markings clearly seen with 5X binoculars at 35 feet—Hennessy and Hammond); Canada Jay, 9; Blue Jay, 10; American Crow, 2; Black-capped Chickadee, 203; Brown-headed Chickadee, 1 (watched 10 min. at 15 ft.; brownish head clearly seen—Lloyd); White-breasted Nuthatch, 17; Red-breasted Nuthatch, 4; Brown Creeper, 1; Wax-wing (sp. ?), 10; Common Starling, 115; English Sparrow, 1,028; Evening Grosbeak, 1; Pine Grosbeak, 32; Redpoll Linnet, 117; American Goldfinch, 39; Slate-coloured Junco, 1; Tree Sparrow, 1; Snow Bunting, 325. Total, 28 species, 2,042 individuals. (One Northern Shrike on December 20.) Black Duck and American Three-toed Woodpecker appear in Ottawa Christmas Bird Census for the first time. Downy Woodpeckers and Black-capped Chickadees are reported in this census in greater numbers than in any previous Ottawa Christmas Bird Census.—*Ottawa Field-Naturalists' Club*.

*Observers:* R. M. ANDERSON, F. E. BANIM, A. W. A. BROWN, J. BROWN, C. H. D. CLARKE, MURIEL CLARKE, MURRAY CURTIS, R. E. DELURY, WILLARD DENNIS, CLAUDE EDWARDS, DONALD GATES, G. H. HAMMOND, T. S. HENNESSY, W. H. LANCELEY, HARRISON F. LEWIS, HOYES LLOYD, ROBERT LOCKWOOD, L. K. POUPORE, D. A. ROSS, E. A. ROSS.

**SOUTH MARCH, CARLETON Co., ONT.**—December 26, 1941; 8.30 a.m. to 4.00 p.m. Cloudiness 100%, 5 in. crusted snow in woods, 25% to 50% bare ground in fields, light northeast wind, temp. 15° at 7.00 a.m., maximum 24°. Observers together; 15 miles afoot; 7 hours, 30 minutes. Ruffed Grouse, 2; Pileated Woodpecker, 1; Hairy Woodpecker, 4; Downy Woodpecker, 1; Canada Jay, 2; Blue Jay, 8; Black-capped Chickadee, 15; White-breasted Nuthatch, 2; Common Starling, 5; English Sparrow, 85; Pine Grosbeak, 2; Redpoll Linnet, 7; Snow Bunting, 2. Total, 13 species, 136 individuals.—B. McL. LEWIS, C. R. LEWIS, HARRISON F. LEWIS.

**PAKENHAM, LANARK Co., ONT.**—December 26, 1941; 7.30 a.m. to 4.15 p.m. Sky overcast, no sunlight during the day; wind light, northeast; fields bare, with scattered patches of snow and ice. A rain continuing all night and day on December 24 took away about 7 in. of loose

snow, so that streams were full and noisy. About 3 in. of well-packed snow in woods. Temp. 18° at start, 25° at noon and at 4.15 p.m. One observer, out all day, walked 8 miles. Other observer out all afternoon, walked 4 miles. Canada Ruffed Grouse, 3; Eastern Hairy Woodpecker, 2; Blue Jay, 8; American Crow, 1; Black-capped Chickadee, 18; White-breasted Nuthatch, 8; Red-breasted Nuthatch, 3; Common Starling, 48; English Sparrow, 95; Evening Grosbeak, 50; Canadian Pine Grosbeak, 4; Common Redpoll, 9; Pine Siskin, 4; Common Snow Bunting, heard. Total, 14 species, 253+ individuals. Canada Jays seen several times in November. An Arctic Three-toed Woodpecker seen in November. December 21, Downy Woodpecker.—ALLAN F. ROSS, EDNA G. ROSS.

**COBOURG, ONT.** (from Pratt's Pond, a small wildlife sanctuary 1 mile north of Cobourg, northeast 5 miles to Baltimore through cedar woods along the stream, returning through hardwoods and open fields).—December 23, 1941; 9.00 a.m. to 6.00 p.m. Overcast; rain all afternoon; wind strong, east; temp. at start, 36°; at finish, 40°; Pratt's Pond frozen over; stream partly so. 1 in. old snow in woods. One observer. Total miles afoot, 10; total hours afoot, 9. Ruffed Grouse, 11; Common Pheasant, 9; Herring Gull, 2; Rock Dove (feral), 11; Mourning Dove, 38; Hairy Woodpecker, 3; Downy Woodpecker, 1; Canada Jay, 1; Blue Jay, 4; Black-capped Chickadee, 31; White-breasted Nuthatch, 1; Brown Creeper, 1; Golden-crowned Kinglet, 4; Red-winged Blackbird, 1; Cardinal, 2; Pine Grosbeak, 4; Redpoll Linnet, 7; American Goldfinch, 4; Slate-coloured Junco, 26; Tree Sparrow, 1; Snow Bunting, 4. Total, 21 species; 166 individuals. At Cobourg on December 22, Greater Scaup Duck, 1; American Golden-eye, 2; American Common Merganser, 4; Great Black-backed Gull, 6; Herring Gull, 300. Also recently: American Robin, White-throated Sparrow, and Song Sparrow.—ALEC LUCAS.

**TORONTO, ONTARIO.**—December 28, 1941; 7.30 a.m. to 4.00 p.m. Cloudy; calm before noon; wind light, west; light snow in afternoon; ground bare until late in day. Max. temp. 28°; min. 14°. Fifty-four observers in twenty-two parties. Common Loon, 1; Horned Grebe, 1; American Pintail, 8; Shoveller, 1; Ring-necked Duck, 2; Greater Scaup Duck, 1,526; American Golden-eye, 379; Buffle-head, 35; Oldsquaw, 975; American Common Merganser, 57; Red-breasted Merganser, 6; Sharp-shinned Hawk, 1; Eastern Red-

tailed Hawk, 1; American Rough-legged Hawk, 2; Eastern Sparrow Hawk, 7; Ruffed Grouse, 11; Common Ring-necked Pheasant, 194; Glaucous Gull, 4; Great Black-backed Gull, 15; Herring Gull, 2,661; Ring-billed Gull, 1; Eastern Screech Owl, 2; Great Horned Owl, 5; Snowy Owl, 4; Barred Owl, 2; American Long-eared Owl, 3; Eastern Belted Kingfisher, 3; Northern Flicker, 2; Eastern Hairy Woodpecker, 18; Northern Downy Woodpecker, 82; Canada Jay, 2; Blue Jay, 118; Eastern Crow, 13; Black-capped Chickadee, 490; White-breasted Nuthatch, 82; Red-breasted Nuthatch, 2; Brown Creeper, 19; Carolina Wren, 1; American Robin, 2; Eastern Golden-crowned Kinglet, 29; Cedar Waxwing, 1; Common Starling, 6,043; English Sparrow, 2,023; Eastern Redwing, 5; Eastern Cardinal, 34; Evening Grosbeak, 3; Eastern Purple Finch, 4; Pine Grosbeak, 13; Hoary Redpoll, 2; Common Redpoll, 733; American Goldfinch, 26; White-winged Crossbill, 2; Savannah Sparrow, 1; Slate-coloured Junco, 388; Tree Sparrow, 291; White-throated Sparrow, 1; Swamp Sparrow, 3; Song Sparrow, 25; Lapland Longspur, 9; Snow Bunting, 274. Total, 60 species, 16,648 individuals. *Observers:* J. L. BAILLIE, F. BANFIELD, H. BARNETT, G. S. BELL, D. BEACHAM, E. BOISSONNEAU, A. CARMICHAEL, M. CLAYTON, MRS. T. CLAYTON, A. F. COVENTRY, A. CRINGAN, J. CROSBY, O. E. DEVITT, F. DINGMAN, R. DINGMAN, Y. EDWARDS, I. ELLIS, F. H. EMERY, B. FALLS, W. GILES, P. HARRINGTON, C. E. HOPE, R. F. JAMES, G. LAMBERT, R. LANNING, R. V. LINDSAY, J. W. MACARTHUR, R. MACARTHUR, J. W. MACARTHUR, JR., D. MACDONALD, C. MACFAYDEN, D. McEACHREN, T. F. McILWRAITH, W. MANSELL, R. MEASHAM, MRS. M. H. MITCHELL, T. MURRAY, K. NIELSON, L. A. PRINCE, C. PROCTOR, H. H. PROCTOR, R. RITCHIE, R. J. RUTTER, J. SATTERLY, D. SCOVILL, W. E. SHORE, T. M. SHORTT, A. SMITH, F. SMITH, L. L. SNYDER, H. H. SOUTHAM, F. STARR, MRS. S. STILWELL, F. A. URQUHART. (*The Brodie Club*).

HAMILTON, ONT. (Dundas Valley west to Ancaster, Hamilton, and Harbor, Stoney Creek, Aldershot, Lake Medad, Burlington, Bronte).—December 21, 1941, 7.40 a.m. to 5.30 p.m. Clear morning and evening, light snow flurry at noon; ground mostly bare; wind 8 mi. N. at start, 15 mi. E. at return; temp. 11° at start, 23° at return. Thirty-one observers working in fourteen parties and at five separate feeding stations. Total hours afield, 81; total party miles, 139 by foot and 125 by car. Common Loon, 2; Horned Grebe, 3; Mallard Duck, 18; Black Duck, 370; Gadwall, 10; Baldpate, 1; Pintail, 2; Ring-necked Duck, 1; Canvas-back, 4; Greater Scaup Duck, 350;

American Golden-eye, 410; Buffle-head, 9; Oldsquaw, 1; White-winged Scoter, 12; Hooded Merganser, 16; American Common Merganser, 239; Red-breasted Merganser, 88; Sharp-shinned Hawk, 1; Cooper's Hawk, 1; Red-tailed Hawk, 7; Red-shouldered Hawk, 1; Common Rough-legged Hawk, 1; Marsh Hawk, 1; American Sparrow Hawk, 3; Ruffed Grouse, 49; European Gray Partridge, 9; Common Pheasant, 133; Killdeer, 1; Glaucous Gull, 2; Great Black-backed Gull, 98; Herring Gull, 1,898; Ring-billed Gull, 16; Great Horned Owl, 4; Snowy Owl, 1; Barred Owl, 2; American Long-eared Owl, 2; Belted Kingfisher, 1; Hairy Woodpecker, 10; Downy Woodpecker, 60; Blue Jay, 61; American Crow, 6; Black-capped Chickadee, 254; White-breasted Nuthatch, 39; Red-breasted Nuthatch, 1; Brown Creeper, 2; Mockingbird, 1; American Robin, 4; Golden-crowned Kinglet, 5; Common Starling, 836; English Sparrow, 1,940; Cardinal, 22; Common Redpoll, 9; American Goldfinch, 27; White-winged Crossbill, 1; Slate-coloured Junco, 391; Tree Sparrow, 291; Swamp Sparrow, 1; Song Sparrow, 12; Snow Bunting, 1. Total, 59 species, 7,741 individuals. Angus Jackson found the Mockingbird at Stoney Creek, feeding on honeysuckle berries.—DON, NEIL and R. D. F. BOURNE, BILL CAMPBELL, YORK EDWARDS, BOB ELSTONE, MRS. J. G. FARMER, MAURICE HACKMAN, PETER HENDERSON, OLIVER HEWITT, A. B. JACKSON, H. E. KETTLE, FRANK KROEGER, MISS J. M. MAGEE, ELEANOR MALCOLM, JOHN MACARTHUR, DON MACDONALD, MRS. A. E. MACLOGLIN, NEIL MATTHEWS, DOUGLAS MCCALLUM, DR. and MRS. G. O. McMILLAN, RUBY MILLS, TOM MURRAY, G. W. NORTH, MRS. H. C. NUNN, KEN RIEGER, DORIS and J. MURRAY SPEIRS, LAURA STEWART, J. H. WILLIAMS (*members Hamilton Bird Protection Society, Inc.*).

WOODSTOCK-INGERSOLL, ONT. (Ingersoll to Waterworks woods, Centreville quarries and cedars, Woodstock City Springs, Sweaburg Swamp, Hodges Pond).—December 28, 1941; 8.30 a.m. to 5.00 p.m. Cloudy, fine snow all day, temp. 28° at 8.30 a.m., subsequently dropping slightly. Three parties during morning, two parties during afternoon. Total mileage: 27 miles by car, 40 on foot. Black Duck, c. 200 (in 2 flocks); Sharp-shinned Hawk, 2; Ruffed Grouse, 6; Ring-necked Pheasant, 9; Herring Gull, 3; Rock Dove, 6; Great Horned Owl, 2; Belted Kingfisher, 1; Hairy Woodpecker, 1; Downy Woodpecker, 19; Blue Jay, 3; Black-capped Chickadee, c. 250 (in small flocks); White-breasted Nuthatch, 8; Golden-crowned Kinglet, c. 100; Common Starling, c. 150; English Sparrow, c. 500; Cardinal, 21; American Goldfinch, 27;

Slate-coloured Junco, 68; Tree Sparrow, 105; Song Sparrow, 2. Total, 21 species, c. 1,483 individuals. December 17, American Robins at Beachville, Hermit Thrush in mink trap at Ingersoll.—E. DUTTON, C. COOKE, W. KRAGH, J. KEEN, D. SIVYER, H. SIVYER, H. MILNES (*Woodstock Naturalist Society*).

ST. THOMAS, ONT. (vicinity of, including Haight's Farm on Catfish Creek, White's Pond at Springwater, Port Stanley, and Port Burwell.)—December 28, 1941; 8.00 a.m. to 6.00 p.m. Cloudy and moderately cold, with light fall of snow in early afternoon. Eight observers in four groups with four other people contributing casual reports. Great Blue Heron, 1; Black Duck, 96; Common Golden-eye, 8; Common Merganser, 1; Red-breasted Merganser, 2; Cooper's Hawk, 2; Red-tailed Hawk, 1; Common Rough-legged Hawk, 6; Ruffed Grouse, 1; Bob-white, 5; Common Pheasant, 7; Herring Gull, 65; Mourning Dove, 5; Great Horned Owl, 1; Short-eared Owl, 1; Pileated Woodpecker, 2; Hairy Woodpecker, 3; Downy Woodpecker, 23; Horned Lark, 1; Blue Jay, 13; American Crow, 10; Black-capped Chickadee, 104; White-breasted Nuthatch, 11; Red-breasted Nuthatch, 2; Brown Creeper, 2; Golden-crowned Kinglet, 2; Common Starling, 199; English Sparrow, 83; Eastern Meadowlark, 1; Cardinal, 31; Redpoll Linnet, 6; American Goldfinch, 39; Slate-coloured Junco, 42; Tree Sparrow, 65; White-throated Sparrow, 1; Song Sparrow, 5; Snow Bunting, 40. Total, 37 species, 887 individuals. December 25, American Robin.—*Elgin Nature Club*, D. YOUNG, *Secretary*.

CHATHAM, ONT.—December 29, 1941, 8.30 a.m. to 5.00 p.m. Clear; wind N. to NW., 4 to 6 miles; one-eighth inch new snow; temperature at 11.25 a.m. 24°, at 5.00 p.m. 25°. Five observers in one party working together; party working hours, 9. Territory, Chatham to the Bradley marsh on Lake St. Clair; Jeannette's Creek to Erieau; Sinclair's woods south of Blenheim; the "Ox-bow" on the Thames River south of Louisville. Holboell's Grebe, 1; Great Blue Heron, 1; Common Canada Goose, 20; Mallard Duck, 1,000 plus; Black Duck, 3,000 plus; Lesser Scaup Duck, 9; American Golden-eye, 37; Buffle-head, 2; American Common Merganser, 73; Red-breasted Merganser, 3; Sharp-shinned Hawk, 3; Cooper's Hawk, 1; Eastern Red-tailed Hawk, 2; (a large hawk flying into the sun near night, probably a Red-tail); American Rough-legged Hawk, 1; Northern Bald Eagle, 2; Marsh Hawk, 8; Bob-white, 6; Ring-necked Pheasant, 1; Herring Gull, 106; Ring-billed Gull, 1; Rock Dove, 8; Eastern Mourning

Dove, 36; Eastern Screech Owl, 1; Northern Flicker, 1; Eastern Hairy Woodpecker, 3; Downy Woodpecker, 8; Prairie Horned Lark, 2; Blue Jay, 1; Eastern Crow, 286; Black-capped Chickadee, 18; White-breasted Nuthatch, 2; Brown Creeper, 1; Common Starling, 75; English Sparrow, 409 plus; Rusty Blackbird, 15; Bronzed Grackle, 1; Eastern Cardinal, 12; Pine Siskin, 1; Eastern Goldfinch, 2; Slate-coloured Junco, 40; Tree Sparrow, 116; Song Sparrow, 1; Common Snow Bunting, 1. Total, 43 species, 5,317 individuals.—D. A. ARNOTT, F. JORDAN, G. M. STIRRETT, H. B. WRESSELL, A. A. WOOD.

BARRIE, ONT. (Within 7-mile diameter, lake shore within town limits and woods and swamp on south and east sides of Little Lake)—December 26, 1941; 9.00 a.m. to 12.30 p.m. and 1.00 p.m. to 6.00 p.m. Overcast, some snow flurries, strong east wind, 4 in. snow with hard crust, temp. 25°. Two observers together in morning, one alone in afternoon. Total hours afield, 8½; total miles on foot, 15; by car, 8 for transportation only. Common Loon, 2; Ring-necked Duck, 2; Canvasback, 1; Greater Scaup Duck, 5; American Golden-eye, 4; White-winged Scoter, 2; Ruffed Grouse, 14; Herring Gull, 50; Ring-billed Gull, 5; Snowy Owl, 1; Pileated Woodpecker, 1; Hairy Woodpecker, 1; Canada Jay, 2; Blue Jay, 3; Black-capped Chickadee, 20; White-breasted Nuthatch, 1; Red-breasted Nuthatch, 1; Golden-crowned Kinglet, 3; Northern Shrike, 1; Common Starling, 50; English Sparrow, 50; Evening Grosbeak, 54; Pine Grosbeak, 11; Redpoll Linnet, 25; Tree Sparrow, 6; Lapland Longspur, 15; Snow Bunting, 100. Total, 27 species, 430 individuals.—EDWIN LAWS, E. L. BRERETON.

MEAFORD, ONT. (from the harbour, two miles eastward along the shore).—December 22, 1941. Fair and mild, little snow left on the ground. No wind. One party of 4 observers. American Golden-eye, 9; American Common Merganser, 61; Ruffed Grouse, 6; Herring Gull, 117 plus; Hairy Woodpecker, 2; Downy Woodpecker, 1; Black-capped Chickadee, 4; White-breasted Nuthatch, 1; Common Starling, 76 plus; English Sparrow, 165 plus; Pine Grosbeak, 2; Common Redpoll, 6. Total, 12 species, 450 individuals.—L. H. BEAMER.

OWEN SOUND, ONT. (within three miles).—December 28, 1941, 10.00 a.m. to 5.00 p.m. Cloudy, with light snow all day, wind light, northeast, temp. about 30°. American Golden-eye, 4; American Common Merganser, 15; Ruffed Grouse, 1; Gray Partridge, 12; Glaucous Gull, 2; Herring

Gull, 395; Black-capped Chickadee, 3; American Robin, 2; Common Starling, 31; Cardinal, 2. Total, 10 species, 467 individuals.—ALF. BUNKER.

NOBEL, ONT.—December 28, 1941, 10.00 a.m. to 2.30 p.m. Mostly cloudy, wind northeast, 4 in. snow on ground, temp. 10° to 18°. By car, Nobel to Pt. au Baril, with trips on foot totalling about 2½ hours. American Golden-eye, 2; Herring Gull, 6; Hairy Woodpecker, 3; Downy Woodpecker, 1; Canada Jay, 2; Blue Jay, 2; Black-capped Chickadee, 10; Brown Creeper, 1; Pine Grosbeak, 3; Redpoll Linnet, 25. Total, 10 species, 55 individuals.—ANGUS BUCHANAN, R. D. USSHER.

FORT WILLIAM—PORT ARTHUR, ONT. (Lower Kaministiquia Valley and area 8 mi. west of Fort William to 15 mi. north-east of Port Arthur)—December 27, 1941, 9.00 a.m. to 5.00 p.m. Clear; 2 in. crusted snow; temp 4° to 16°. 14 observers in 5 parties; 60 miles by auto, 10 miles on foot. American Golden-eye, 4; American Common Merganser, 5; duck (sp.), 200; Ruffed Grouse, 6; Herring Gull, 69; Rock Dove, 7; Pileated Woodpecker, 2; Hairy Woodpecker, 7; Downy Woodpecker, 9; Canada Jay, 5; Blue Jay, 2; American Crow, 12; Black-capped Chickadee, 53; Bohemian Waxwing, 16; Common Starling, 78; English Sparrow, 50; Pine Grosbeak, 9; Redpoll Linnet, 3; White-winged Crossbill, 10. Total, 18 species, 547 individuals. Seen recently: American Robin (J.S.L.); Red-breasted Nuthatch (J.S.L.); Evening Grosbeaks, (A. E. ALLIN).—H. BRAUN, D. BECKETT, G. K. EOLL, MRS. G. K. EOLL, C. GARTON, K. HUTTON, J. S. LOWCOCK, C. MACDONALD, MRS. MURISON, R. MUIR, MISS S. PACE, J. SULLIVAN, MRS. E. WATTS, R. WILSON.—(*Thunder Bay Field-Naturalists' Club*).

CAMROSE, ALBERTA.—December 27, 1941. Clear, no wind, six in. snow, temp. all day about -10°. To Battle River by auto, then through spruce woods along the river on foot for two miles, returning to Camrose by west route, 20 miles. Ruffed Grouse, 2; Sharp-tailed Grouse, 12; Gray Partridge, 30; Ring-necked Pheasant, 3 males; Hairy Woodpecker, 2; Blue Jay, 3; Magpie, 2; Black-capped Chickadee, 5; Pine Grosbeak, 50; Common Redpoll, 100. Total, 10 species, 209 individuals.—FRANK L. FARLEY.

CRESCENT, B.C.—December 27, 1941, 8.30 a.m. to 4.30 p.m. Bright and sunny all day; temp. around 26° at sunrise. Coastline and bushland between Crescent and Ocean Park. Three observers in one party. About 10 miles on foot. Common Loon, 5; Holboell's Grebe, 2; Horned Grebe, 8; Western Grebe, 3; Pelagic Cormorant, 1; Northwest Coast Heron, 2; Black Brant, 125 plus; Mallard Duck, 7; Pintail, 200 plus; Green-winged

Teal, 50 plus; Canvas-back, 10; Greater Scaup Duck, 200 plus; American Golden-eye, 3; Barrow's Golden-eye (?), 2; Buffle-head, 11; Harlequin Duck, 7; White-winged Scoter, 15; Surf Scoter, 20 plus; American Scoter, 11; Killdeer, 7; Red-backed Sandpiper, 100 plus; Sandpiper (sp. ?), 12; Glaucous-winged Gull, 10; Short-billed Gull, 25; Pigeon Guillemot, 2; Short-eared Owl, 1; Harris's Woodpecker, 2; Gairdner's Woodpecker, 1; Northwestern Crow, 7; Oregon Chickadee, 17; Chestnut-backed Chickadee (?), 1; Red-breasted Nuthatch, 2; Winter Wren, 9; Varied Thrush, 3; Golden-crowned Kinglet, 5; Ruby-crowned Kinglet (?), 1; Pine Siskin, 16; Oregon Towhee, 5; Oregon Junco, 14; Sooty Fox Sparrow, 1; Rusty Song Sparrow, 12. Total, 37 species (+ 4 species uncertain), 935 plus individuals. The larger numbers were estimates. Two American Robins were seen December 30.—MARTIN W. HOLDOM, MARY W. HOLDOM, FRANCES E. L. HOLDOM.

COMOX DISTRICT, VANCOUVER ISLAND, B.C. (Courtenay to Comox, river and estuary to sea at Comox with side trips, the same as in previous years).—December 23, 1941, 9.00 a.m. to 4.00 p.m. Bright sun after slight frost, wind negligible, northwest; temp. about 32° start and finish, quite warm at mid-day. Observers together on foot, about 7 miles. Common Loon, 7; Pacific Loon, 4; Red-throated Loon, 1; Holboell's Grebe, 4; Horned Grebe, 8; Western Grebe, 10; Pied-billed Grebe, 2; White-crested Cormorant, 11; Violet-Green Cormorant, 2; Northwest Coast Heron, 4; Mallard Duck, 150 plus; Baldpate, 900 plus; Greater Scaup Duck, 250; American Golden-eye, 260; Buffle-head, 55; Old-squaw, 1; White-winged Scoter, 1,500 plus; Surf Scoter, 1,000 plus; American Scoter, 5 plus; Hooded Merganser, 8; American Common Merganser, 11; Red-breasted Merganser, 10; Bald Eagle, 1; Ring-necked Pheasant, 2; American Coot, 150 plus; Wilson's Snipe, 3; Red-backed Sandpiper, 50 (est.); Glaucous-winged Gull, 750 plus; Thayer's Gull, 10 plus; Short-billed Gull, 65 plus; Belted Kingfisher, 4; Northwestern Red-shafted Flicker, 9; Harris's Woodpecker, 3; Gairdner's Woodpecker, 1; Steller's Jay, 1; Western Crow, 2; Northwestern Crow, 80; Oregon Chickadee, 1; Red-breasted Nuthatch, 2; Winter Wren, 10; Seattle Wren, 2; Varied Thrush, 1; Golden-crowned Kinglet, 1; Ruby-crowned Kinglet, 5; English Sparrow, 3; Meadowlark (sp. ?), 6; Brewer's Blackbird, 100 plus; Purple Finch (sp. ?), 30; Towhee (sp. ?), 8; Oregon Junco, 23; Fox Sparrow (subsp. ?), 1; Rusty Song Sparrow, 16. Total, 51 species (one represented by 2 subspecies), 5,543 plus individuals. Seen within 2 days, Killdeer, Western Robin, and Audubon's Warbler.—THEED PEARSE and A. R. DAVIDSON.

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## CONTENTS

## PAGE

Edward Martin Kindle, 1869-1940. By Alice L. Wilson .....	31
Alsatsaspis in Newfoundland. By Cecil Kindle .....	33
Birds of Leeds' County, Ontario (continued). By G. C. Toner, W. E. Edwards and Murray W. Curtis .....	34
Book Reviews:—	
The Ferns of Nova Scotia. By H.A.S. ....	44
A Lot of Insects. By A.W.A.B. ....	44
Notes and Observations:—	
Cougar in Saskatchewan. By C. H. D. Clarke .....	45
Red-Bellied Woodpecker in Manitoba. By B. W. Cartwright .....	45
A Backyard Beaver. By Clyde L. Patch .....	46

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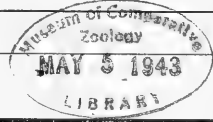
# The Canadian Field-Naturalist

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OTTAWA, CANADA, MARCH, 1942

No. 3

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## EDWARD MARTIN KINDLE 1869 - 1940

For more than a quarter of a century a familiar figure, he moved down the corridors of the National Museum at Ottawa, walking with left hand in coat pocket searching for a key or a paper-scrap of memorandum, right arm swinging slightly forward, square shoulders moving from side to side with the rhythm of his step. At first a blank look from level eyes recognized one's presence. Then the expression slowly changed as the thoughts were drawn back from the contemplation of time to the small moment of the present, and the face lighted with a warm smile.

Dr. Kindle's life was devoted to two fields, his family, and his chosen profession of geology, or to such part of geology as one man can undertake in piecing together the broken and isolated facts of the mosaic of the story of the earth. Dr. Kindle's philosophy of life was the outcome of a thoughtful mind which looked upon the universe as a whole. He interpreted in that light the widely varying observations of a well-trained eye—observations as commonplace as the symmetrical slope of a wave ripple, and the asymmetrical slope of a current ripple, or observations as difficult to obtain as those from geological explorations beyond the Arctic Circle.

He was broad in his outlook, intolerant only of intolerance, tenacious of purpose. Once he was convinced of the need of a course of action, no difficulty could stay or obstruct him. He took an active interest in the problems of others, and when advice was asked he was ever ready to give stimulating suggestions based upon his varied experiences. Personally he had a great dislike of smoking and drinking. He was a member of the Unitarian Church, and was actively engaged in the Men's Club of that organization.

On his scientific side he took an interest in many phases of natural history beside his own branch of it. From his field trips he brought

back from remote regions such specimens as he found for the archaeologist, botanist or biologist. Upon one occasion, one of his specimen boxes emitted a horrible odour. When opened—behold, a decomposing lunch! History does not say whether in his enthusiasm he went lunchless that day, or whether, having looked for lunch he found, not bread, but a stone.

To most naturalists snakes, however small, are like vice

... a monster of so frightful mien

As to be hated needs but to be seen,

Yet seen too oft, familiar with her face

We first endure, then pity . . . .

Well, hardly 'embrace', not even a naturalist usually goes so far as that. But all through his life Dr. Kindle, like the non-naturalist, never got beyond the second line.

Photography was another of his absorbing hobbies. He had a large collection of pictures, a regular gallery of the interests of his life—interests large and small, human, scientific, bizarre, commonplace, in everyday life, or occurring in strange places.

Another of his unusual side-lines was the fascinating study of insectivorous plants.

Dr. Kindle continued some of his investigations after his retirement. One day in Florida he was walking along the seashore intent upon some question of sedimentation when he came upon a strange creature, about five feet long, thrown up on the beach. It was still breathing. He recognized a baby whale. In great excitement he got in touch with a Florida marine aquarium. Now a whale is not a rare animal in the ocean, but a baby whale in captivity is a most unusual phenomenon. It now reposes in the aquarium. But alas! All babies, whatever their kind, are alike in one thing—even a baby whale will not stay a baby whale.

When a boy on his father's farm, near Franklin, Indiana, he once wrote in a letter that he 'found boulders from rocks not native to Indiana but carried south from Canada by glaciers,' and he then resolved to see the country whence they came. But years passed before he really did come to see. By that time his attention had turned from the Precambrian boulders to other phases of geology.

Edward Martin Kindle was born on March 10th, 1869. His father in addition to being a farmer taught school in the district, a Hoosier schoolmaster. This son was the only one of several children to grow to maturity. He early showed evidence of a remarkable memory, and his father planned for him a university education. While throughout life geology was his profession, farming was his recreation, as those will testify who watched the development of his small farm some three miles east of Ottawa.

When twenty years of age, he procured a horse and buggy with a certain amount of field equipment. Accoutred with these and armed with considerable determination, he presented himself to the Arkansas Geological Survey to work, gratis, for the experience. At that, it was a profitable summer, for it was his introduction to Dr. G. D. Harris, who was to be an adviser for some years to come, and a friend for more than fifty years. Dr. Kindle was graduated from Indiana State University in 1893, earned some money as Instructor in Geology in his Alma Mater the following year, then followed Dr. Harris to Cornell University where, two years later, he obtained his M.Sc. under him.

The rocks of Indiana are sedimentary in nature, limestones, sandstones and shales, filled with fossils. It was this environment and Dr. Harris' interest in the fossils which probably turned his attention to palaeontology. It was as palaeontologist that he made his first journey beyond the Arctic Circle with the Cornell expedition to Greenland.

From 1898 to 1901 he was Assistant Geologist to the Indiana State Survey, during which time he completed his work for and obtained his doctorate in geology from Yale. At Yale he came into close contact with another great figure in Palaeontology, Charles Emerson Beecher.

He married Margaret Ferris of Grand Rapids, Michigan. To them was born a large family, six daughters and three sons. All of the sons have followed his profession.

In 1901 he was appointed Geologist to the

Federal Survey at Washington. In 1918 he was chosen to be Invertebrate Palaeontologist to the Geological Survey of Canada, after the resignation of Dr. P. E. Raymond. He held this position until the death of L. M. Lambe, when he became chief of the Division of Palaeontology, a position which he held for twenty years, until his retirement. The scientific results of Dr. Kindle's observations and conclusions are contained in more than a hundred and seventy-five articles, the majority of which were published by scientific periodicals or organizations. As mentioned above, he continued work on several projects until his death on August 29th, 1940.

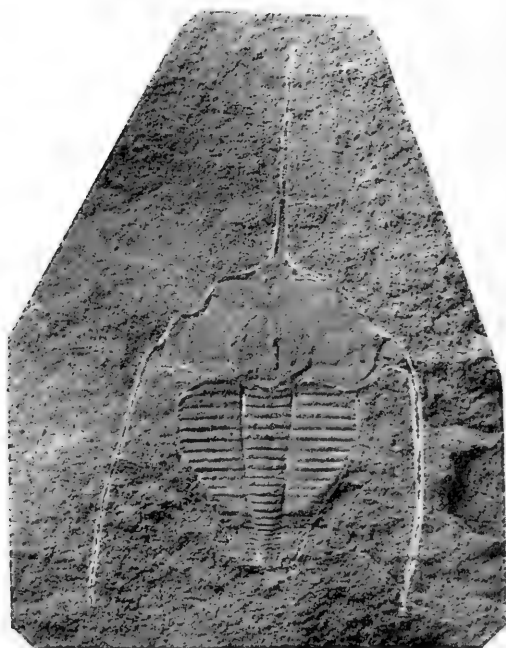
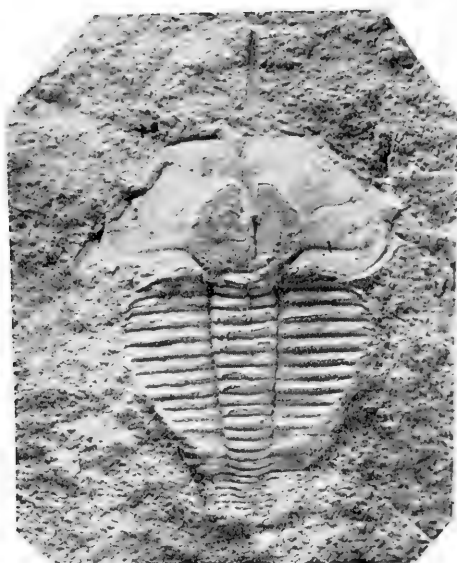
One of Dr. Kindle's early interests lay north of the Arctic Circle. His introduction to it was on the eastern side when he went to Greenland. A few years later he twice visited the western Arctic as palaeontologist on United States Government geological expeditions to Alaska. Three years later, with an assistant, he spent a third season in Alaska. On two separate occasions the Geological Survey of Canada sent him beyond the Circle in the interior, down the Mackenzie valley. In 1921 he was lent to the Labrador Boundary Commission. Few men have had such an opportunity to obtain an intimate knowledge of the North. The scientific reports of these expeditions appear in various publications, but the wide scope of his observations and interest in the north is revealed in his essay on *Canada North of Fifty-six Degrees*, which won the \$1,000.00 prize offered by Sir William Price.

In his college days Dr. Kindle was a member of the Phi Beta Kappa and Sigma Xi societies. In later life he was a member or was elected a fellow of all societies which pertained to his work—member of the Association of American Geographers, of the Canadian Mining and Metallurgy Institute, Palaeontological Society of America, and the Canadian Author's Association, elected fellow of the Geological Society of America and Royal Society of Canada. In 1928 he was a special lecturer in Geology in the University of London, England. He held many offices of honour. In 1930-31 he was chairman of the Geology Section of the Royal Society of Canada, the following year vice-president of the Geological Society of America, and later president of the Palaeontological Society of America.

For many years Dr. Kindle was a member of the Ottawa Field-Naturalists' Club. In the year 1930-31 he was its president, and later geological editor of *The Canadian Field-Naturalist*, the organ of the federated Naturalist Clubs. For



EDWARD MARTIN KINDLE  
1869 - 1940



*ALSATASPIS EVANSI n.sp.*

Upper figure: 3.3x natural size

Lower figure: 2.5x natural size,  
with the original extent of the spines drawn in.

some years both before and after he was a member of the Council of the Ottawa club. He regarded his position as a responsibility, and was always present when questions of policy were discussed, ready with his considered opinion.

With the small intimate group of the executive he was well-known. He was less well-known to

a wider group, as leader of various geological excursions during the summer activities of the Ottawa Field-Naturalists' Club. During the spring especially a large number of Ottawa Normal School pupils often attended these outings, and his enthusiasm for the story of the earth will be remembered by many teachers throughout Eastern Ontario.—ALICE E. WILSON.

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## ALSATASPIS IN NEWFOUNDLAND

By CECIL KINDLE

*Department of Geology, College of the City of New York*

---

IN 1940 a peculiar trilobite from the lower Ordovician rocks of Texas was described in the Journal of Palaeontology by Professor F.

E. Turner. He named it *Alsataspis bakeri*, erecting a new genus and family to hold this singular specimen. Not only was its structure strange but also its mode of occurrence, for it was found in a graptolite fauna of "*Tetragraptus*, numerous dendroid graptolites, *Hyolithes* and *Lingula*." Trilobites do not commonly occur with graptolites as the latter are usually floating organisms of open sea waters.

It is therefore of considerable interest to record another occurrence of this genus found in a similar association with lower Ordovician graptolites. It is a new species described here as *Alsataspis evansi*. It was discovered while Dr. Helgi Johnson and the writer were mapping an area on the west coast of Newfoundland for the Geological Survey of Newfoundland. In collecting *Phyllograptus* and other graptolites at one locality, the hammer of Mr. Kevin Evans, an assistant to the party from St. John's, exposed the specimen. Like the species from Texas, it is remarkably complete. Although the true length of the anterior spine is in doubt, the impression of the other spines in the rock split off above the specimen shows that they extend beyond the posterior end of the pygidium.

In his paper *Palaeozoic Plankton of North America* (G.S.S., Memoir 2) Dr. Ruedemann has pointed out that trilobites with very long spines have commonly lived in a pelagic environment, where the spines have served to help keep

them suspended in water currents. This view is supported by *Alsataspis*, which has been found associated only with the remains of pelagic organisms. Perhaps an existence with floating seaweeds accounts for the poor development of its pygidium or tail-piece. Like some early Cambrian forms, the thoracic segments are so poorly differentiated from those of the pygidium that it is difficult to tell where one ends and the other begins.

This persistence of primitive characters in trilobites living in the same environment as graptolites is not unusual. *Triarthrus* occurs with upper Ordovician graptolite faunas, showing a persistence in geologic time far beyond that of other genera of its family, the Olenidae, which flourished in Cambrian time.

The fossils found in association with it have been identified by Dr. Helgi Johnson as: *Phyllograptus ilicifolius* Hall, *Didymograptus bifidus* (Hall), *D. caduceus* Salter, and *Lingula quebecensis* Hall. This is a Middle Deepkill fauna.

The one and only specimen of *Alsataspis evansi* n.sp., has a length of 1.5 cm. not counting the spines. It has fewer segments than *A. bakeri* and has a more clearly defined pygidium. Another distinction is that the spines are attached further forward at the side of the head than in the species from Texas. The specimen was found on the second small point east of the abandoned oil well on the south shore of St. Paul's Inlet, Newfoundland. The specimen will be deposited in the Princeton University Collections.

## BIRDS OF LEEDS COUNTY, ONTARIO

By G. C. TONER, W. E. EDWARDS and MURRAY W. CURTIS

(Continued from page 23)

**BALD EAGLE.** *Haliaeetus leucocephalus*.—Bald eagles are rather common in the county. They are now protected and should increase, though this is doubtful. Many hunters regard them as harmful and shoot them when they can. A court case in Gananoque, November, 1937, when two men were found guilty of shooting one of these birds and were fined, brought before the public the fact that eagles and ospreys are protected by our game laws.

**Bateau Channel:** A nest of this species was occupied for some years before 1930. (*W.E.E.*)

**Beverly Lakes:** C. L. Broley states that there are nests on both the upper and lower lakes that are used each year. (*G.C.T.*)

**Charleston Lake:** Young noted a nest that had been used for many years (18). Eagles are reported as still nesting on this lake. (*G.C.T.*)

**Gananoque Lake:** I noted a pair of eagles around their nest tree at Lost Bay, April 29, 1937. (*G.C.T.*)

**Marble Rock:** Young stated that bald eagles nested here every year before 1892. (*G.C.T.*)

**Red Horse Lake:** On November 3, 1938, a dead eagle in immature plumage was found near the portage to Charleston lake. Apparently it had been shot by grouse hunters and left where it had fallen. (*G.C.T.*)

**South Lake:** Two adults were noted on a nest, April 24, 1938. (*W.E.E.*) F. E. Ferguson reports that there are two cypress on this lake, one at the north side and the other on one of the islands. Both have been occupied for many years. (*G.C.T.*)

**Rideau Canal:** Vennor noted eagles along this waterway from Kingston to Smiths Falls. (27)

**MARSH HAWK.** *Circus hudsonius*.—This hawk is found throughout the county, nesting in wet meadows. It is more often noted than any of the other raptors.

**Athens:** Four young marsh hawks seen in a swamp, September, 1926. (*M.W.C.*)

**Lake Elvida:** Female marsh hawk taken October 3, 1938, is now in the R.O.M.Z. (*M.W.C.*)

**Newboro:** W. J. Miller reported these hawks as common over and around the Bog in 1934 and 1935 but was unable to locate nests. (*G.C.T.*)

**Rockport:** A pair noted a number of times in 1934 on the wide marshes east of the village. (*G.C.T.*)

**OSPREY.** *Pandion haliaeetus*.—There is some confusion in regard to a nest from this county recorded both by Young (18) and by Baillie and Harrington (2). The former stated that a nest was

found May 23, 1900, at Gananoque Lake, containing three eggs, and further stated that this was the only nest of which he knew in Leeds. In (2) there is recorded a set of three eggs, one of which is now in the R.O.M.Z., taken May 23, 1900, by W. E. Shelburne at Charleston Lake. As Young and Shelburne worked together it is probable that both these records refer to the same nest and very likely it was situated on Charleston Lake. Fish hawks are now protected by the Ontario Game Laws, so there is hope that they will increase.

**Beverly Lakes:** C. L. Broley states that there are four nests on these lakes that are used each year. (*G.C.T.*)

**Brockville:** W. J. Miller has sight records from here. (*G.C.T.*)

**Gananoque:** In the fall of 1934 an osprey was shot near the town. Left overnight, it was partly eaten. A trap was set the next night to catch the supposed skunk, but a great horned owl was caught (*G.C.T.*)

**South Lake:** On a tall hemlock stub, east of No. 32 Highway, an osprey nest, with two half grown young, was found on July 19, 1939. Photographs were taken of the young in the nest. (*G.C.T.*)

**Troy Lake:** W. J. Miller watched an eagle rob an osprey over this lake on September 4, 1926. (*G.C.T.*)

**Wiltzie Lake:** Four ospreys were noted fishing on this lake on September 26, 1938. (*M.W.C.*)

**Westport:** Between this village and Newboro, Vennor noted 13 nests on one point before 1876. He mentioned that they were common on the lakes below Newboro. (27)

**DUCK HAWK.** *Falco peregrinus*.—There are two nesting sites of the duck hawk in Leeds County as far as can be ascertained. The Charleston Lake location is the nest from which C. J. Young, Ed. Beaupre, Wm. Shelburne and others, took eggs in the early 1900's. One of us, (*M.W.C.*), has examined this nest during several different nesting seasons but collected no eggs nor birds. It should not be necessary to take any more specimens from here. Perhaps, if the nesting site is left undisturbed the birds may populate other parts of the province, though Mr. Taverner tells us that this is a vain hope. Other sites are known where these hawks have nested for years, but the numbers of duck hawks never increase, the young seeming to scatter, probably taking vacated sites. Two sets of eggs are in the R.O.M.Z. from this Charleston Lake nest; set of four taken May 2,



1901, by Wm. Shelburne, another set of four taken June 10, 1913, by Edwin Beaupre. Mr. Beaupre also noted a set of four eggs in this nest on April 23, 1903. Another nesting site has been located by F. E. Ferguson on the fifth concession of the township of Leeds. This is probably the nest mentioned by Beaupre (5). Mr. Ferguson reports that young birds have been raised to maturity each year for the past ten years.

**SPARROW HAWK.** *Falco sparverius*.—This small falcon is common in many parts of the county, seeming to prefer the open farming country rather than the heavily wooded area.

Athens: A pair nested and raised a brood in 1937. (M.W.C.)

Gananoque Junction: W. J. Miller found a nest on May 28, 1928, in a cavity in a telephone pole. Four eggs were in the nest. The male was captured, photographed and then liberated. In 1935 a pair of these hawks raised a family in a similar site near the Junction. (G.C.T.)

**SPRUCE GROUSE.** *Canachites canadensis*.—This grouse is apparently extinct in the county at the present time, but formerly it was common. One was taken in Lanark, near the Leeds border, in the deer hunting season of 1935.

**RUFFED GROUSE.** *Bonasa umbellus*.—The ruffed grouse is common throughout the wooded portions of the county. During the 1938 open season quite good bags were made by some parties of hunters.

Athens: Ruffed grouse are frequently seen. A specimen in the R.O.M.Z. was taken November 10, 1938. (M.W.C.)

Gananoque: A specimen sent to the R.O.M.Z., November 4, 1934. (G.C.T.)

Temperance Lake: W. J. Miller found a nest with 11 eggs on May 11, 1933. (G.C.T.)

**GRAY PARTRIDGE.** *Perdix perdix*.—This bird is an introduction from Europe that seems to be increasing in parts of the county. In a letter to *The Brockville Recorder and Times*, dated November 28, 1934, one of us (G.C.T.) gives some pertinent data on the first liberations in the county. "In July, 1933, the Leeds County Fish and Game Protective Association (Gananoque) liberated four pair of Hungarian Partridge near Gananoque Lake. A letter from the Ontario Game and Fisheries Department states that in 1933, in addition to the above, four pair were liberated at Portland, four pair at Chaffey's Locks and four pair at Newboro." Since the dates given above there have been a number of other liberations, particularly in the vicinity of Brockville.

South Lake: A pair, male and female, noted near the county line on May 11, 1938. This is only about five miles from Brewer's Mills,

Frontenac County, where six pair were liberated in 1930. (G.C.T.)

Brockville: Partridge have increased greatly in the past few years. They were first liberated in 1934, birds that had been sent to the Brockville Rod and Gun Club by the Game and Fisheries Department, and in the winter of 1938-39 over 200 in four or five coveys could be found in close vicinity to the town. (G.C.T.)

**COMMON PHEASANT.** *Phasianus colchicus*.—The pheasant was introduced by the Game and Fisheries Department about the year 1925. They do well in some seasons, but cold winters reduce their numbers almost to the vanishing point and it takes some time for the stock to be built up again. It is unlikely that pheasants will ever be plentiful enough to give more than a short open season.

Lyndhurst: In the winter of 1933-34 pheasants were very abundant. I placed a trail of grain from the nearest thickets to the dining room window and finally succeeded in luring the birds to come there and feed. Early in the morning, just about noon and at dusk, they appeared; often five or six at a time. They were nearly always females, for the males refused to come into the open. Always wild, they would make for cover at the first sign of danger. (M.W.C.)

Newboro: In March, 1934, W. J. Miller observed a male that lacked the neck ring typical of the birds found in this Province. (G.C.T.)

**SANDHILL CRANE.** *Grus canadensis*.—There is some slight evidence that the sandhill crane was casual in the county at one time. Wintemberg (28) found bones of cranes, *Grus* spp., in his excavation of the prehistoric village site of Roebuck, Grenville county, only a few miles from the Leeds line. About 1890, J. Thompson, an old guide and hunter, saw a pair of sandhill cranes hanging in a tree near Mud creek. They had been hung up by some hunter who apparently did not recognize them. Mr. Thompson had lived for some years in the west and was familiar with these birds. The final bit of evidence is given by Young (29) who stated that a flock of sandhill cranes were seen passing over the village of Escott in 1890.

**VIRGINIA RAIL.** *Rallus limicola*.—This rail is reported as breeding in the county. It is seldom seen, for it haunts the great cattail marshes of the lakes and river. Young (18) stated it was the commonest rail of the St. Lawrence valley fronting Leeds.

Gananoque Lake: Young found a nest of the Virginia rail in this vicinity. (18)

Gananoque: A live bird was caught on the road north of the town on April 25, 1939, and was sent to the R.O.M.Z. (G.C.T.)

**SORA RAIL.** *Porzana carolina*.—The Sora is common throughout the county, but unless a special trip is made to its habitat, the cattail marshes, it is seldom noted. Young (2) stated it was more generally distributed than the Virginia Rail but apparently did not breed so plentifully.

**Bateau Point:** I was shown a set of eggs of this rail, collected about June 3, 1937. (G.C.T.)

**Brockville:** W. J. Miller states that the sora is common in this vicinity. (G.C.T.)

**Gananoque:** A specimen found dead, September 1, 1936, is in the R.O.M.Z. (G.C.T.)

**FLORIDA GALLINULE.** *Gallinula chloropus*.—This gallinule is common in suitable marches throughout the county. Young (18) stated that they nested in the inland marshes and along the St. Lawrence between Kingston and Brockville.

**Bateau Channel:** A nest, containing ten eggs, was photographed June 10, 1937. (W.E.E.)

**Beverly Lakes:** C. L. Broley reports this bird as quite common. (G.C.T.)

**Lansdowne:** Ed. Beaupre and C. J. Young found a nest with one egg on June 10, 1896. (2)

**Legg's Creek:** A specimen shot September 15, 1934, is in the R.O.M.Z. (G.C.T.)

**Rideau Canal:** A review in *The Canadian Field-Naturalist*, 1923, XXXVII: 59, stated that Florida Gallinules were noted as summer residents and as breeding on the Rideau marshes between Kingston and Kemptville. The author of this review was Mr. Taverner. (G.C.T.)

**AMERICAN COOT.** *Fulica americana*.—The status of this bird as a summer resident is rather uncertain. We have had them reported to us but have not found any nests nor have we noted young birds. Coots are fairly common in spring and in the fall.

**Newboro:** W. J. Miller examined a specimen shot October 23, 1934. He states that they are known locally as "marsh chickens." (G.C.T.)

**Wiltzie Lake:** Coots are usually common here each fall, but in 1938 were quite scarce. (M.W.C.)

**PIPING PLOVER.** *Charadrius melodus*.—This bird is found breeding along the St. Lawrence river but is more often noted as a spring and fall migrant.

**Rockport:** C. J. Young collected a set of two eggs on June 18, 1894, that are now in the N.M.C. (2)

**KILLDEER PLOVER.** *Orychus vociferus*.—The killdeer is an abundant summer resident throughout Leeds, seeming to prefer wet meadows and pastures near water as its habitat. Young (18) found a few pair breeding in the county each year but did not give nesting localities.

**Hudson Point:** Downy young observed by C. H. D. Clarke, July 11, 1926.

**Mallorytown Landing:** Male killdeer collected on April 18, 1938, now in the R.O.M.Z. (M.W.C.)

**Newboro:** W. J. Miller found a nest with four eggs on May 20, 1935. (G.C.T.)

**Willowbank:** A nest, from which four eggs hatched, was watched in 1932. (W.E.E.)

**RUDDY TURNSTONE.** *Arenaria interpres*.—This bird is a rare migrant in the county. Four were noted on lower Beverly Lake about June 1, 1930, by C. L. Broley.

**AMERICAN WOODCOCK.** *Philohela minor*.—The woodcock is not uncommon in Leeds as a summer resident and, as well, there are a number of breeding records.

**Athens:** Five woodcock were noted in September, 1938. (M.W.C.)

**Brockville:** W. J. Miller regards this species as rare, for his only records were made in 1925. (G.C.T.)

**Charleston Lake:** I flushed an incubating bird in May, 1932, near La Rose Bay. Four eggs were in the nest. (G. C. T.)

**MacIntosh Mills:** Young found a nest, June 3, 1891, with three greatly incubated eggs. (18)

**WILSON'S SNIPE.** *Capella delicata*.—Snipe are common around the marshes and the weedy lakes in spring and summer. This summer population is augmented in early fall when the migrants arrive to rest and feed before passing south.

**Athens:** A nest with four eggs found in June, 1925. (M.W.C.)

**Brockville:** From W. J. Miller's notes; "On May 30, 1931, I found a nest in a very small marsh at the westerly limits of the town, containing two eggs. The snipe tried the age-old trick of 'broken wing' to lure me from the nest" (G.C.T.)

**Gananoque Lake:** A specimen from the Wiltzie Creek marsh, taken October 28, 1938, is in the R.O.M.Z. The same day more than fifteen snipe were noted in the marsh. The water was very low with great exposed mud bars on which many shore birds were feeding. (G.C.T.)

**Phillipsville:** A pair of snipe were flushed along the creek on August 4, 1937. (G.C.T.)

**UPLAND PLOVER.** *Bartramia longicauda*.—The upland plover appears to be rare in this county. Breeding is known to have occurred, but most of the records are of migrant birds.

**Beverly Lakes:** C. L. Broley noted a single bird in 1937. (G.C.T.)

**Lansdowne:** In June, 1894, a pair raised a brood near this village, according to Young. (18)

**Wiltzie Lake:** Upland plover are occasional fall visitors. On August 18, 1938, three were noted at Athens, an unusual appearance at that time of the year. (M.W.C.)

**Hudson Point:** Observed in July, 1926, by C. H. D. Clarke.

**SPOTTED SANDPIPER.** *Actitis macularia*.—The little "tip-up" can be found on every lake and river in the county throughout the summer. Young (18) stated it was common along the St. Lawrence where he found it breeding among the Islands.

Athens: A pair of spotted sandpipers nested here in 1938. (M.W.C.)

Bateau Point: Common summer resident, probably breeding. (W.E.E.)

Beverly Lakes: C. L. Broley informs me that four young hatched on June 2, 1939, on the stony beach of his island. (G.C.T.)

Hudson Point: Young birds noted in 1923. (W.E.E.)

Wyoming Island: Three young and one egg found on July 14, 1939, by H. W. Follmer. (G.C.T.)

Yonge's Mills: An adult and two small young noted on July 13, 1934. (G.C.T.)

**SOLITARY SANDPIPER.** *Tringa solitaria*.—There is some danger of confusing this species with the spotted sandpiper. Taverner (24) has given as field marks: the lack of white wing bars, which the spotted possesses; more white barring on the tail; and a tendency to nod rather than teeter. The breeding status of the solitary in Leeds is based entirely on Young's records (18) which are probably erroneous. Another paper by Young (31) cites many records of these birds in the county. The R.O.M.Z. library has a separate with a marginal notation by the author, C. J. Young, dated June 19, 1927, as follows: "No doubt a spotted sandpiper as I know now they do not nest on the ground". At the end of this separate is a further notation reading: "How mistaken one may be and how easily, C.J.Y."

**GREATER YELLOW.** *Totanus melanoleucus*.—This bird is a rather common migrant in the fall but is seldom noted in the spring.

Gananoque: Twelve were noted east of the town on September 28, 1934. The next day one of this flock was shot and brought to me, but I was unable to preserve it. (G.C.T.)

Gananoque Lake: Two Greater Yellowlegs were noted on the Wiltsie Creek marsh, October 28. Lake Elolida: A specimen taken October 3, 1938, is now in the R.O.M.Z. (M.W.C.)

**LESSER YELLOWLEGS.** *Totanus flavipes*.—We have very few records of this bird. Game Overseer R. G. Sheppard prosecuted a resident of the Charleston district for having six of these birds in his possession, and secured a conviction. The birds were shot about October 1, 1937.

**PECTORAL SANDPIPER.** *Pisobia melanotos*.—The only record from this county of the "grey snipe" is a specimen taken October 28, 1938, on Wiltsie Creek marsh, Gananoque Lake, now in the R.O.M.Z. The one secured was from a flock of four.

**GREAT BLACK-BACKED GULL.** *Larus marinus*.—As the ice leaves the St. Lawrence river in the spring large flocks of gulls gather to feed on the edible debris brought in by tributary streams. Conspicuous by their size and darker coloration, black-backed gulls can be easily picked out from the herring gulls that make up the majority of the flocks. In 1937 and in 1938 efforts were made to secure specimens but without success. The black-back is very wary and this, with the rotten ice, prevented close approach. Off Gananoque is the only place they have been noted in the county and only for about a month in mid-March.

**HERRING GULL.** *Larus argentatus*.—The herring gull is a common summer resident that will often remain in the county as long as there is open water in the lakes and rivers. They are quite abundant on the St. Lawrence.

Newboro: We drove over the ice in a car, February 18, 1938, to examine hoop nets set in the bog. About twenty gulls were feeding on the discarded fish that had been left on the ice. (G.C.T.)

Gordon Island: A number of eggs of herring gulls were found June 1, 1938, on the shoals to the west of the island. No estimate was made of the number of birds feeding. (G.C.T.)

**RING-BILLED GULL.** *Larus delawarensis*.—We have no records of this gull, but as it has been found breeding in abundance near Kingston it undoubtedly occurs on the River St. Lawrence.

**BONAPARTE'S GULL.** *Larus philadelphia*.—This gull is sometimes noted in the spring and fall along the St. Lawrence.

Rockport: Young noted one on June 11, 1893. (18)

Beverly Lakes: C. L. Broley noted an immature-plumaged bird in 1933, but this was undoubtedly raised elsewhere. (G.C.T.)

**COMMON TERN.** *Sterna hirundo*.—This tern is an abundant summer resident and breeder along the St. Lawrence. At times it is common on many of the inland lakes.

Black Ant Island: Merwin visited this island on June 26, 1916, and noted a breeding colony of terns. (19)

Bostwick Island: On Gull rock, a shoal near the island, 15 nests of common terns were counted on June 10, 1937. (W.E.E.)

Brockville: W. J. Miller has given me many summer records of this tern. (G.C.T.)

Chimney Island: Young found 30 nests in a colony here in 1895 and 12 nests in the same colony in 1896. (18)

Gordon Island: Many terns breed on the shoals to the west of this island. I have seen eggs collected from here. (G.C.T.)

**BLACK TERN.** *Chlidonias nigra*.—Almost every large marsh in the county will have a few black

terns. They are abundant from late May to early September along the St. Lawrence River.

Bateau Channel: In June, 1938, six nests of this tern were examined and eggs, nests and adults photographed in the marsh of the main shore. (W.E.E.)

Gananoque Lake: Young found a nest containing three eggs on July 7, 1893, and stated that every year he visited the lake he found two or three nests. (18)

Halstead's Bay: Three black tern's nests were examined, May 29, 1935. (G.C.T.)

Lansdowne: Baillie and Harrington (2) mentioned that Ed. Beaupre and C. J. Young found a nest with three eggs on June 10, 1896. As the nearest water is Gananoque Lake it is probable that this was the site. (G.C.T.)

Wilsie Lake: Black terns are here throughout the summer. (M.W.C.)

BRUNNICH'S MURRE. *Uria lomvia*.—The status of Brunnich's Murre in this county is based on several old records. Young (18) stated that they had become plentiful on the St. Lawrence between Kingston and Brockville in the later years of his residence in the county. He recorded that 40 mures were killed near Rockport in December, 1897, and in an earlier paper (32) stated that one was taken at Lansdowne in 1900. Fleming (15) recorded specimens from the Rideau Lakes.

MOURNING DOVE. *Zenaidura macroura*.—The mourning dove is not uncommon in Leeds county and has been reported as breeding.

Athens: These doves have become more numerous of late years. They have been noted on occasion at Plum Hollow and Hard Island. A flock of fifty was seen at Athens on September 9, 1938, and a specimen, now in the R.O.M.Z., was taken September 14, 1938. (M.W.C.)

Lansdowne Township: Young recorded a pair of these doves in April, 1891. (18)

South Lake: F. E. Ferguson reports mourning doves as nesting in this vicinity (G.C.T.)

PASSENGER PIGEON. *Ectopistes migratorius*.—An extinct species, whose Ontario status has been carefully documented by Mitchell. (21). Her only reference to Leeds was in table 3, p. 97, stating that these pigeons at times were noted in Elizabethtown near Brockville.

YELLOW-BILLED CUCKOO. *Coccyzus americanus*.—This bird is a common summer resident throughout Leeds.

Lansdowne: Young found nests with eggs on May 29, 1898, and May 23, 1899. (18)

Niagara Island: One brought to me that had been killed accidentally in September, 1936. I was unable to preserve the specimen. (G.C.T.)

Westport: One found dead on the road, July

7, 1936, about three miles north of the village.

BLACK-BILLED CUCKOO. *Coccyzus erythrophthalmus*.—The black-billed cuckoo is a common summer resident throughout the county, although, with the exception of Young's statement (18) that he found it breeding in eastern Ontario, there are no records.

AMERICAN SCREECH OWL. *Otus asio*.—The screech owl is a year-round resident, most often noted in winter when it comes into the towns and villages.

Brockville: W. J. Miller has given me many records from here. (G.C.T.)

Gananoque: A specimen taken November 6, 1938, is in the R.O.M.Z. (G.C.T.)

Lansdowne: Young caught a screech owl alive in October, 1891 (29), and mentions noting immature birds. (18)

Lyndhurst: In the winter of 1933-34 these owls came into the yard almost every evening, apparently looking for scraps on the snow. One visited the back porch regularly, after sparrows that roosted on the inside ledges. (M.W.C.)

HORNED OWL. *Bubo virginianus*.—This owl is common, a resident throughout the year in the wooded areas of the county. Nests have been found on various occasions, and live specimens have been sent to the Toronto Zoo.

Athens: A year-round resident, most often noted in winter. (M.W.C.)

Bateau Point: Horned owls raised young here in 1920, 1923, 1930 and 1934. Photographs of the nest and eggs secured in 1930. (W.E.E.)

Beverly Lakes: C. L. Broley informs me that these owls are common. (G.C.T.)

Gananoque: Baillie and Harrington recorded the finding of a nest with three young on April 26, 1935, by G. C. Toner (2). Four specimens sent from here to the R.O.M.Z. in the years 1934-38. (G.C.T.)

Lyndhurst: Great horned owls are quite numerous in winter. (M.W.C.)

Newboro: From W. J. Miller's notes: "Near the Bog, in open woods, a nest with two young was found May 6, 1935. Remains of a cock pheasant were on the rim of the nest. Later, first one, and then the other, of the nestlings, was found dead on the ground. Crows were very bothersome to the owls and may have had something to do with the deaths of the young." (G.C.T.)

SNOWY OWL. *Nyctea nyctea*.—Snowy owls are periodic winter visitors. Scarcity of food in the north appears to be the reason for the great flights that sometimes occur in southern Ontario. Reports would indicate that these owls were common in 1935-36 and in 1936-37, but not so common in 1937-38. As they do not arrive till late November or early December, the shortened open season on waterfowl prevents hunters from killing them along the river as they did

formerly, when the season extended to the first of January. Most of those reported have been noted over the river marshes. It is interesting to read that Young (18) noted snowy owls as common in the years that he worked the region.

**BARRED OWL.** *Strix varia*.—The barred owl is often noted in winter and it may breed in the wooded areas of the county. Baillie and Harrington (2) stated that the eggs of this species have never been found in Ontario, but C. J. Young noted immature birds from Brockville, which they doubtfully accept as a breeding record.

Brockville: Young stated that he saw five young birds that had been shot about a mile from this town in July. This is the record referred to above. (18)

Gananoque: A barred owl remained for several hours, November 26, 1938, in a tree near the centre of the town, long enough for the local bird men to see it. (G.C.T.)

**GREAT GREY OWL.** *Scotiaptex nebulosa*.—The only record for this species in the county is given by Young (29) who stated that one was shot near Blue Mountain in 1891. There is a specimen in a collection of mounts owned by a resident of Gananoque. This collection is without data, and while the owner states most of them were taken locally, it is entirely possible that the owl might have been shot elsewhere.

**LONG-EARED OWL.** *Asio wilsonianus*.—There are not many records of the long-eared owl in this county, but there are sufficient to say that it is a summer resident. It probably breeds in parts of the county.

Lyn: Young reported a long-eared owl shot near here in 1893. (18)

Beverly Lakes: C. L. Broley reports these owls as common. (G.C.T.)

Red Horse Lake: W. J. Miller informs me that he examined one, shot August 9, 1929. (G.C.T.)

**SHORT-EARED OWL.** *Asio flammeus*.—This owl is not common. There are few records, but since it has been found breeding in Frontenac, there is a possibility that it will be found breeding in Leeds.

Lansdowne: Young recorded a specimen shot in this vicinity in 1891. (18)

**ACADIAN OWL.** *Cryptoglaux acadia*.—This owl, formerly known as the saw-whet, is rare in Leeds. Young (18) took one alive on one of the islands of the river and stated it nested sparingly along the St. Lawrence.

Lyn: W. H. Lunn collected a specimen on November 10, 1936, now in the R.O.M.Z. (G.C.T.)

**WHIP-POOR-WILL.** *Antrostomus vociferus*.—The

whip-poor-will is a common summer resident of Leeds. It is more abundant in the wooded portions than in the farming districts.

Athens: On June 27, 1927, a nest of this species was found in deep woods. (M.W.C.)

Bateau Point: This species is a common summer resident of the woodlands. (W.E.E.)

Gananoque: A specimen from here in the R.O.M.Z. (G.C.T.)

Thousand Islands: Young stated they were common on the Islands where he found nests on three different occasions. (18)

**NIGHTHAWK.** *Chordeiles minor*.—The nighthawk is a common summer resident of the towns and villages, where it nests on flat roofs.

Athens: Nests have been found each year on the flat limestone north of the village. (M.W.C.)

Gananoque: Nighthawks nest each year on the roof of the Bank of Montreal building. Another nesting site is the roof of a garage on the main street. A brood was raised here in 1936. After the young were fledged and flying, they roosted in the daytime in a large oak whose branches came over part of the roof. (W.E.E.)

**CHIMNEY SWIFT.** *Chaetura pelagica*.—The chimney swift is common, breeding throughout the county.

Athens: Chimney swifts can be noted at almost any time in summer flying over the village. (M.W.C.)

Gananoque: In 1936 a swift's nest fell into a grate of a residence on Church street. One of the young was killed. (W.E.E.)

South Lake: Three nests with eggs were found June 15, 1936, in a vacant house. (G.C.T.)

**RUBY-THROATED HUMMINGBIRD.** *Archilochus colubris*.—This hummingbird is found throughout the county in summer.

Athens: The nest of a ruby-throat was found in 1934. (M.W.C.)

Brockville: L. M. Burns sent me a nest of this bird from which he watched a brood depart in 1938. (G.C.T.)

Gananoque: A large vine on the side of a house was the site of a nest in 1934. Two young were raised. (W.E.E.)

**BELTED KINGFISHER.** *Megasceryle alcyon*.—Kingfishers can be found on every lake and stream in Leeds county. They arrive early in April and remain well into November, as long as their fishing water is ice-free.

Bateau Point: Two pair have nested in this vicinity for some years. (W.E.E.)

Escott: A nest was found south of the village 1938. (G.C.T.)

on June 8, 1934. (G.C.T.)

Newboro: W. J. Miller reports a pair that nested in a small sand bank near the Bog in 1933, 1934 and 1935. (G.C.T.)

**YELLOW-SHAFTED FLICKER.** *Colaptes auratus*.—This flicker is abundant in Leeds. It breeds throughout the region, seeming to prefer the open farm lands to the forested areas.

Bateau Point: One or two pairs have nested every season for the past twenty years. (W.E.E.)

Gananoque: Flickers raised a brood of young in 1935 to the east of the town. (G.C.T.)

**PILEATED WOODPECKER.** *Coepthloecus pileatus*.—When C. J. Young worked this county between 1889 and 1901 he noted a continuing decrease in the number of pileated woodpeckers, which had culminated in extirpation before 1900. (18). Early in the 1920's these birds started to return, until to-day they are fairly common in the woodlands. This increase seems to be continuing. W. J. Miller's notes on this species are interesting in that they show the way the increase has appeared to most observers in Leeds; "First recording at Gananoque, 1925; Buck Island, Charleston Lake, August, 1929; Brockville, May, 1931, and yearly thereafter; common at Newboro, 1933 and 1934; and common at Lyndhurst, 1937."

Lyndhurst: H. Halladay found a nest with three young in a cavity in a poplar, 18 feet from the ground, in July, 1935, according to W. J. Miller. (G.C.T.)

Lansdowne: The R.O.M.Z. has a specimen taken November 2, 1934, by J. A. Bradley. (G.C.T.)

**RED-HEADED WOODPECKER.** *Melanerpes erythrocephalus*.—This woodpecker is so striking in colour that it cannot be mistaken for any other bird. It is not common but is noted from time to time in various parts of the county.

Eden Grove: A pair of these birds noted several times in 1937. (G.C.T.)

Elgin: This woodpecker was noted near here each summer between 1934 and 1939. (G.C.T.)

Escott: Young noted winter birds in 1891 and another in December, 1899. (18)

Gananoque: A pair nested in a hollow post near the west gates for several years between 1915 and 1925. (W.E.E.)

Hudson Point: W. J. Miller noted one in August, 1927. (G.C.T.)

Temperance Lake: W. J. Miller recorded this woodpecker on May 25, 1929. (G.C.T.)

**YELLOW-BELLIED SAPSUCKER.** *Sphyrapicus varius*.—This sapsucker is a common spring and fall migrant that breeds sparingly in the wooded areas of the county.

Athens: Summer birds have been noted a number of times. (M.W.C.)

Brockville: W. J. Miller found a nesting site in Grant's woods in an old poplar, on May 20, 1930. The birds were watched taking turns in digging out a cavity. On returning a week later he found that a flying squirrel had usurped the hole. (G.C.T.)

Delta: A pair of sapsuckers stayed near Conklin's Point all summer, 1938. (G.C.T.)

Grenadier Island: Young stated that sapsuckers nested for several years in succession in a poplar tree near the foot of the island. (18)

Junetown: Ed. Beaupre took a set of four eggs on May 23, 1900, that are now in the R.O.M.Z. (2)

Lansdowne: The R.O.M.Z. has a set of 2 eggs collected May 31, 1899 by C. J. Young. (G.C.T.)

**HAIRY WOODPECKER.** *Dryobates villosus*.—The hairy woodpecker is a year-round resident, quite common in the woodlots of the county.

Athens: A specimen is in the R.O.M.Z., collected March 8, 1939. (M.W.C.)

**DOWNY WOODPECKER.** *Dryobates pubescens*.—This is the common woodpecker of orchards, small woodlots and the village shade trees. It remains throughout the year.

Beverly Lakes: C. L. Broley showed me an incubating downy woodpecker on June 3, 1939. A brood of six was raised in this same area in 1938. (G.C.T.)

**ARCTIC THREE-TOED WOODPECKER.** *Picoides arcticus*.—This woodpecker is a rather rare winter visitor that should be looked for in the deeper woods.

Landon's Bay: Young noted these birds as late as mid-May. (18)

**KINGBIRD.** *Tyrannus tyrannus*.—The kingbird is common in the farming communities of the county. When driving along the roads it is quite conspicuous, and so is recorded more often than many other birds that may be just as abundant but are more retiring in their habits.

Bateau Point: Nest and young of the kingbird photographed in 1938. (W.E.E.)

Athens: A pair nested in an apple tree in 1928, the young being killed by parasites. (M.W.C.)

Lansdowne: E. Beaupre collected a set of two eggs on June 11, 1896, that are now in the R.O.M.Z. (G.C.T.)

**CRESTED FLYCATCHER.** *Myiarchus crinitus*.—The crested flycatcher is common in most woodlands throughout the county, usually breeding wherever found.

Bateau Point: A pair noted several times in 1937 in McNinch's woods. (G.C.T.)

Ivy Lea: A pair nested in 1936 in a gourd about three hundred yards east of the International bridge. (G.C.T.)

**PHOEBE.** *Sayornis phoebe*.—The phoebe is very abundant throughout Leeds, every bridge and boathouse having a nesting pair.

Athens: This species is a very common breeder. (M.W.C.)

Bateau Point: For the past twenty years two

or three pair have nested every summer near the cottage. (W.E.E.)

Brockville: W. J. Miller records it as a common breeder. (G.C.T.)

Delta: Nest, with young, in the boathouse at Conklin's Point on August 1, 1937. (G.C.T.)

TRAILL'S FLYCATCHER. *Empidonax trailli*.—This species, formerly known as the alder flycatcher, has been reported from along the St. Lawrence.

Lansdowne: Young found this flycatcher breeding. (18)

Hudson Point: This species was noted near the boys' camp in 1927. (M.W.C.)

LEAST FLYCATCHER. *Empidonax minimus*.—We have only a few records for the least flycatcher in Leeds, though it is probably very common. Young (18) stated that he found it to be a common breeder in the county.

Athens: A nest of this species was found in 1926. (M.W.C.)

Temperance Lake: W. J. Miller noted this flycatcher on May 31, 1926. (G.C.T.)

Westport: W. H. Lunn noted these birds in May, 1932. (G.C.T.)

WOOD PEWEE. *Myiochanes virens*.—The pewee can be heard calling in every patch of woodlands from early May till mid-summer. Young (18) stated it was common in Leeds and mentioned he had found it breeding.

Bateau Point: A pair of pewees raised a brood in 1937. (W.E.E.)

Gananoque: W. J. Miller found a nest with two eggs early in July, 1924. (G.C.T.)

HORNED LARK. *Otocoris alpestris*.—Horned larks are common in the county, appearing each year in late February or early March.

Athens: Horned larks are often noted and are probable breeders, but I have been unable to find nests. The R.O.M.Z. has two specimens collected April 13 and 14, 1939. (M.W.C.)

Escott: C. J. Young collected a set of two eggs on April 5, 1897, that are now in the R.O.M.Z. (G.C.T.)

Lansdowne: Young stated he found nests in the township. (18)

South Lake: On April 12, 1937, a pair were watched for several hours in an unsuccessful effort to find their nest. (G.C.T.)

TREE SWALLOW. *Iridoprocne bicolor*.—This species is probably the most abundant swallow in the county. On the evening of July 16, 1936, one of us (G.C.T.) counted over 3 400 tree swallows on the wires between Gananoque and Marble Rock, a distance of seven miles.

Athens: A nest box at my home is inhabited annually. Five young were raised in 1938. (M.W.C.)

Beverly Lakes: C. L. Broley had 12 pair in nest boxes on his island on June 3, 1939. (G.C.T.)

Bateau Point: Tree swallows have occupied nest boxes for at least twenty years. (W.E.E.)

Corn Island: C. K. Clarke collected a set of 7 eggs on June 1, 1898, that are now in the R.O.M.Z. (G.C.T.)

Gananoque: Near the town a farmer has used discarded boiler tubes for fence posts. In 1936 over 30 of these posts contained tree swallows' nests. (G.C.T.)

BANK SWALLOW. *Riparia riparia*.—Breeding colonies of bank swallows are found throughout Leeds wherever suitable sand banks can be found for nesting sites.

Bateau Point: A large colony, over 100 birds, is in the sand banks near here. This site has been used for 20 years. (W.E.E.)

Escott: A colony of 15 pair noted on June 8, 1934. (G.C.T.)

Gananoque: A quite large colony has been located in a gravel pit, two miles north of the town for several years. (G.C.T.)

Grippen Lake: A colony of about ten birds used a gravel pit for burrows in the years 1936, 1937, 1938 and 1939. (G.C.T.)

Halstead's Bay: Along the new road a colony of these birds had excavated a number of burrows by June 3, 1938. (G.C.T.)

Willowbank: A large colony has nested here for several years. (W.E.E.)

ROUGH-WINGED SWALLOW. *Stelgidopteryx ruficollis*.—The rough-winged swallow is rather uncommon in this county. The late Dr. Klugh showed one of us (G.C.T.) a large number of these birds feeding on Red Horse lake, April 23, 1932. They were taking a small unidentified fly that was hatching from the water. Several rough-wings were noted by the members of the Federation of Ontario Naturalists on their annual field day at Gananoque Lake on May 23, 1938.

Gananoque: On May 24, 1939, a pair of rough-wings were flying in and out of a 3-inch steam pipe set in the wall of an abandoned factory on the river bank. Nesting was suggested but the pipe curved, making it impossible to note a nest if present. (G.C.T.)

BARN SWALLOW. *Hirundo erythrogaster*.—The barn swallow is abundant throughout Leeds. Most farmers protect these birds when they nest in their buildings.

Gananoque: Barn swallows nested and raised broods in at least five loat houses along the river in 1938. (G.C.T.)

Gananoque Lake: In the barn at Lakeside House seven pairs raised broods in 1937 and eight pairs nested in 1938. (G.C.T.)

Lansdowne: Ed. Beaupre collected a set of four eggs on June 11, 1896, that are now in the R.O.M.Z. (G.C.T.)

Willowbank: Ten pairs nested in 1937 and 1938 in a farmer's barn near the Highway. (W.E.E.)

CLIFF SWALLOW. *Petrochelidon albifrons*.—Cliff swallows are rather uncommon at the present time. They were fairly abundant about thirty years ago, but their numbers dwindled until they became quite rare. In the past few years there has been an increase and new colonies are being established.

Bateau Point: A pair built in the boathouse in 1938 but deserted the nest before eggs were laid. (*W.E.E.*)

Crosby Lake: Baillie and Harrington stated that nine occupied nests were noted on July 7, 1936, by G. C. Toner. (2)

Hudson Point: Fifteen nests noted under the eaves of a barn in 1923. (*W.E.E.*)

Willowbank: Two pair nested here in 1936, 1937 and 1938. (*W.E.E.*)

Beverly Lakes: On June 3, 1939, five nests were noted on a barn at the northwest corner of the lake. The swallows were still at work on the structure. (*G.C.T.*)

PURPLE MARTIN. *Progne subis*.—Martins will occupy colony houses almost anywhere in Leeds. They are more abundant near the lakes and rivers.

Athens: A male, collected April 20, 1938, is now in the R.O.M.Z. (*M.W.C.*)

Ellisville: J. Dillon has a large colony house on his farm that has been used by martins for over 25 years. (*G.C.T.*)

Gananoque: Fourteen pair nested under the eaves of a local factory in 1938. At least 10 colony houses set up by residents are used each season by these birds.

Gananoque Junction: For several years before 1938, about 15 pairs of martins nested on the stand of the watertower. The wooden tank was replaced in that year and the martins did not return in 1939. (*G.C.T.*)

Newboro: A quite large colony house, near one of the hotels, has been occupied for many years. (*G.C.T.*)

Westport: There are several bird houses in the village that are used by martins. (*G.C.T.*)

CANADA JAY. *Perisoreus canadensis*.—The "whiskey jack" is a casual visitor in winter. Young (18) recorded one from Westport, and we have a sight record from Gananoque Lake where one stayed for several weeks in early 1938.

BLUE JAY. *Cyanocitta cristata*.—The blue jay is common throughout the year in Leeds. It occasionally appears at feeding tables in the towns, as happened in the winter of 1937-38 at Gananoque. Young (18) stated it was common in the winters and that nests had been found in the region.

Junetown: The R.O.M.Z. has a set of four eggs, collected May 14, 1902, by W. E. Shelburne. (*G.C.T.*)

Marble Rock: W. J. Miller found a nest, with four eggs, on May 21, 1924. (*G.C.T.*)

RAVEN. *Corvus corax*.—In pioneer days the raven was a resident of Leeds but now, and for many years past, it has only appeared as a casual stray. Fleming (18) stated it was abundant along the north shore of Lake Ontario but disappeared at an early date. One of us, (*W.E.E.*), noted a raven flying over the St. Lawrence in the vicinity of Gananoque on February 3, 1938.

AMERICAN CROW. *Corvus brachyrhynchos*.—The crow is abundant throughout the county. Some few remain through the winter but the greater number migrate south, returning late in February or early in March.

Athens: Crow's nests are quite common. On April 29, 1937, a nest with one egg was examined, and on March 7, 1939, a male was collected, now in the R.O.M.Z. (*M.W.C.*)

South Lake: Over 15 hermit thrushes were noted on May 18, 1937, near the small brook at the southwest corner of the lake. (*W.E.E.*) (2)

BLACK-CAPPED CHICKADEE. *Penthestes atricapillus*.—These chickadees are abundant residents of the wooded lands of the county.

Athens: Noted here for the first time in winter is in the R.O.M.Z. (*M.W.C.*)

Bateau Point: A pair nested in 1920. (*W.E.E.*)

Lansdowne: Young stated that he found chickadees breeding. (2)

South Lake: A pair of chickadees were noted April 24, 1938, excavating a hole in a birch stump. The pieces were carried some little distance from the site. (*W.E.E.*)

BROWN-HEADED CHICKADEE. *Penthestes ludsonicus*.—The brown-headed chickadee is an uncommon winter visitor which only appears in southern Ontario at intervals.

Ivy Lea: On March 22, 1938, a small flock of these chickadees stayed for about 20 minutes in a grove of conifers near the International Bridge. (*G.C.T.*)

WHITE-BREASTED NUTHATCH. *Sitta carolinensis*.—This nuthatch is a common resident of the county.

Athens: A specimen from here in the R.O.M.Z. was collected on October 19, 1938. (*M.W.C.*)

Gananoque: A specimen taken November 15, 1936, is in the R.O.M.Z. (*G.C.T.*)

Wilstead: W. J. Miller found a nest in a hollow limb, containing three eggs, on May 12, 1924, in the woods towards Gananoque. (*G.C.T.*)

RED-BREASTED NUTHATCH. *Sitta canadensis*.—The red-breasted nuthatch is an uncommon spring and fall migrant that sometimes stays throughout the winter.

Athens: Noted here for the first time in winter on January 1, 1938. (*M.W.C.*)

Gananoque: One was noted in the garden searching over an apple tree on May 2, 1935 (*G.C.T.*)



Lansdowne: Young stated that the species was uncommon. (18)

**BROWN CREEPER.** *Certhia familiaris*.—The brown creeper is a common migrant, more often noted in spring than in fall.

Athens: A very common spring migrant. (M.W.C.)

Beverly Lakes: C. L. Broley reports having seen a pair feeding young in this vicinity. (G.C.T.)

Brockville: W. J. Miller has given us many spring records. (G.C.T.)

Gananoque: I have a number of spring and fall records for this bird. (W.E.E.)

**HOUSE WREN.** *Troglodytes aedon*.—The house wren is quite common in gardens and orchards throughout the county.

Bateau Point: Three pair nested within a 40-foot circle in 1938. I have photographs of the adults and nests. (W.E.E.)

Benson's Island: I was told that wrens have used a number of the bird houses each year since 1900. (G.C.T.)

Gananoque: A pair nest each year in a bird box at my home on Church street. (W.E.E.)

Beverly Lakes: C. L. Broley has given me many records of nesting wrens from this vicinity. (G.C.T.)

**WINTER WREN.** *Nannus hiemalis*.—The winter wren is common in spring and fall in deep woods and thick swamps.

Athens: One collected, April 13, 1938, is now in the R.O.M.Z. (M.W.C.)

Beverly Lakes: C. L. Broley has records of summer birds. (G.C.T.)

Lansdowne Township: Young noted this wren as common and breeding; he found a nest in the cavity of a stump. (18)

Hudson Point: Observed in July, 1926 by C. H. D. Clarke.

**PRAIRIE MARSH WREN.** *Telmatodytes palustris*.—This wren is quite abundant in the larger cattail marshes of the St. Lawrence and the inland lakes.

Bateau Channel: Many wrens' nests in the cattails along the shore in 1938. Nests were photographed. (W.E.E.)

Gananoque Lake: These wrens are abundant breeders in the Wiltsie Creek marsh. (G.C.T.)

Halstead's Bay: Nest with three eggs found on May 29, 1935. (G.C.T.)

**SHORT-BILLED MARSH WREN.** *Cistothorus stellaris*.—The short-billed marsh wren has been found breeding at Kingston and undoubtedly will be found breeding in this county. It is restricted in its habitat and even in suitable places it is irregular in occurrence and local in distribution.

**MOCKINGBIRD.** *Mimus polyglottos*.—This bird is included in the authority of Mr. W. H. Lunn, who noted a specimen near Gananoque Junction on two occasions, about November 12, 1936. Mr. Lunn informs us that there is no doubt of the

identification, as he has seen these birds in South Carolina.

**CATBIRD.** *Dumetella carolinensis*.—The catbird is common, breeding throughout Leeds. It is found wherever thick shrubbery gives it shelter for its nest.

Athens: A quite common breeder. (M.W.C.)

Gananoque: Several pairs nest each year on the wooded hillside above Bay Street. (W.E.E.)

Row's Corners: A nest with three eggs found June 8, 1938, in the thick brush along the small creek that flows through the peat bog. (G.C.T.)

**BROWN THRASHER.** *Toxostoma rufum*.—This bird seems to prefer the farmlands that have thickets and trees surrounding the fields. We have no nesting records but it undoubtedly breeds in the county.

Athens: Very common summer resident. (M.W.C.)

Marble Rock: A pair noted on three different occasions during the summer of 1937. (G.C.T.)

**ROBIN.** *Turdus migratorius*.—The robin is familiar to everyone. It nests in the towns and villages, around the farm buildings and a few are even found breeding in the back pastures. Robins usually arrive quite early in April. In 1938 almost eight inches of snow fell April 9th. Many robins had arrived a few days previous but were able to survive the two days storm. They gathered in sheltered spots where the snow was not deep. When they were forced to light in the deeper snow they seemed unable to rise quickly, and no doubt cats got a few. The day after the storm the sun melted the snow along the edges of buildings and along the walks. The robins quickly gathered in these places, apparently finding plenty of food.

In Gananoque robins averaged during 1938 about four pair to the block and each pair seemed to raise two broods during spring and early summer. The first brood leaves the nest about May 15, and by June 1 another nest is built and ready for the eggs. The house cat is the main enemy of the robin, killing large numbers when they are first ready to fly. It may be that cats are the check on the species that prevents robins from becoming a nuisance to man.

Waterton: S. C. Downing collected a set of three eggs on May 12, 1937, that are now in the R.O.M.Z. (G.C.T.)

**WOOD THRUSH.** *Hylocichla mustelina*.—The wood thrush is uncommon and we have few records. Young (18) stated that he had seen the species in Leeds county.

Brockville: W. J. Miller has several sight records. (*G.C.T.*)

Gananoque: From W. J. Miller's notes: "In a small hawthorn near the R.C. cemetery I found a nest of the wood thrush and later found other nests in similar situations elsewhere. This nest was found on May 18, 1924, and was built of dried beech leaves, fine twigs, rootlets and weed stalks, lined with mud and finer grasses. It contained three eggs of a uniform pale blue." (*G.C.T.*)

HERMIT THRUSH. *Hylocichla guttata*.—The hermit thrush is not uncommon in the county, breeding in suitable localities.

Gananoque: Two hermit thrushes were picked up dead on April 27, 1935. (*G.C.T.*)

Junetown: A set of three eggs, collected by Ed. Beaupre, on June 11, 1901, are in the R.O.M.Z. Lansdowne: Young found these thrushes breeding. (18)

OLIVE-BACKED THRUSH. *Hylocichla ustulata*.—This thrush is uncommon in Leeds, probably only occurring as a migrant, for its breeding range is north of the county.

Lansdowne: Young found a dead bird about the end of April, 1898. (18)

WILSON'S THRUSH. *Hylocichla fuscescens*.—The veery of most authors is not uncommon in the more isolated sections of the county. Young (18) stated it was a common breeding species.

Athens: Noted annually, evidently breeding. (*M.W.C.*)

Bateau Point: I have a few records of the veery from this vicinity. (*W.E.E.*)

Brockville: W. J. Miller has given me records of this thrush. (*G.C.T.*)

BLUEBIRD. *Sialia sialis*.—The bluebird is an abundant summer resident that nests throughout the county.

Bateau Point: Photographs of a pair that nested in a bird<sup>h</sup>box in 1926. (*W.E.E.*)

Willowbank: A pair nest each year in a hollow post. (*W.E.E.*)

Lansdowne: C. J. Young collected a set of three eggs in May, 1890, that are now in the N.M.C. (*G.C.T.*)

South Lake: A nest in a hollow post, with four eggs, found on May 9, 1939. (*G.C.T.*)

GOLDEN-CROWNED KINGLET. *Regulus satrapa*.—This kinglet is very common in the early spring and uncommon in fall and winter.

Athens: Six observers on several different occasions, December, 1937, and January, 1938. Unusual at this time of the year. A male and female were collected on April 13, 1938, and are now in the R.O.M.Z. (*M.W.C.*)

Gananoque: On April 10, 1938, golden-crowned kinglets were common over the Bluff. (*G.C.T.*)

RUBY-CROWNED KINGLET. *Corthylio calendula*.—The ruby-crown is a common spring and fall migrant.

Brockville: W. J. Miller has given me the following dates for this species in this vicinity: April 3, 1926, April 1, 1933, and May 14, 1939. (*G.C.T.*)

Gananoque: On April 24, 1935, with Dr. Harrison F. Lewis who identified several ruby-crowns on the Bluff. (*G.C.T.*)

(*To be continued*)

## BOOK REVIEWS

THE FERNS OF NOVA SCOTIA; by A. E. Roland. *Proceedings Nova Scotian Institute of Science, Halifax, Nova Scotia. Vol. 20, pp. 64-120. 1941.*

This valuable account of the ferns of Nova Scotia, by the Provincial Botanist, presents keys, brief descriptions, and notes on habitat, range and abundance. In all, 43 species, 7 varieties and 12 forms are mentioned as occurring in the province.

The key to genera and commoner species is illustrated by simple but adequate line drawings which add greatly to its usefulness. Further keys are presented for the species of larger and more technical genera. The nomenclature has been carefully brought up to date. In addition to notes on the distribution within the province, the general range of each species is stated. Maps are included showing the distribution of some of the less common species. An interesting

feature of the paper is the brief note discussing the bibliographic history of each species.

The author discusses the work of earlier botanists interested in the ferns of Nova Scotia, and also cites many references to technical papers which will aid the student of the local ferns in prosecuting more detailed investigations.

The ferns have always been of special interest to botanists, particularly to amateurs. This paper will be invaluable in studying the ferns of Nova Scotia, and will also be of great use for most regions in eastern Canada. It is the type of local flora which is sorely needed in Canada. —H.A.S.

A LOT OF INSECTS, *Entomology in a Suburban Garden*; by Frank E. Lutz; G. P. Putnam's Sons, New York; 304 pp., illustrated, price \$3.00.

title on a pun,— and get away with it. The central theme of this book is furnished by the insects which Dr. Lutz has found in his own suburban lot in the vicinity of New York, of which he found 1,402 species. On this thread he has strung a series of essays and vignettes arranged in a pleasing inconsequentiality of order.

Among entomological writers Lutz is unique. His *Field Book of Insects* won him that distinction, and this, his second book, does not lose it. He may be called with justice the Fabre of America, with an added distinctive flavor deriving from a more technically trained mind combined with a Yankee twist of philosophy. And so he can carry the layman's interest into entomology without being tedious, and can jolt the entomologist out of too formal thought-channels.

Migration, mimicry, balance of nature, luminosity, and parasitism are a few of the leading questions whose riddles the author explores, and

leaves his reader with a clear idea what the riddles are. He also discusses in detail two fields on which he has done a great deal of original research himself, namely insect vision, (especially in the ultra-violet), and the stridulation of Orthoptera. In fact the book is shot through with problems on which the author has done some degree of research. One wonders how many biologists could stand the test of making a similar exposition of their own work to lay readers.

The book is well illustrated by photographs and line-drawings, most of them original. There are rather more misprints than usual. The practice of carrying the footnotes to the end of the book, and putting them under a chapter title "In Addition", has enabled the author to put all the detail he likes into them, and is a successful feature of the work. The field-naturalist will read this book with profit, and will be vastly entertained.—A.W.A.B.

## NOTES AND OBSERVATIONS

COUGAR IN SASKATCHEWAN.—What may prove to be the first definite record of the Cougar, *Felis concolor* Linnaeus, in Saskatchewan, appeared in *Happy Motoring*, trade organ of the Imperial Oil Company, Toronto, in 1941. The record is in the form of a photograph of the dead cougar, submitted in a prize competition of "Snapshot Stories".



Miss Gwen L. Smith has kindly supplied the following information on request of the National Parks Bureau. The cougar was shot on a farm south of Kindersley, Sask., on Section 32, Township 26, Range 22, west of the 3rd meridian, by Mr. Harry Wahlgemuth, on August 18th, 1939. It had already been credited with killing 75

chickens and 20 turkeys. It weighed 130 lbs. and measured 7 feet from nose to tip of tail. Some of the local people believed there are more in the vicinity, as large tracks had been seen in both mud and snow.

Kindersley is a small town about 50 miles from the Alberta border and 170 miles north of the International Boundary (in this case, Montana).

Our indebtedness is acknowledged to the Imperial Oil Company, of Toronto, who kindly supplied the cut at their own expense.—C. H. D. CLARKE.

RED-BELLIED WOODPECKER IN MANITOBA.—On May 29, 1941, Bert Skinner reported a Red-bellied Woodpecker, *Centurus carolinus* (Linnaeus), in Kildonan Park, Winnipeg. The record was confirmed by A. G. Lawrence, who saw a pair in the same locality, and later the male was observed by L.T.S. Norris-Elye. The birds were seen throughout the month of June, but persistent efforts to locate the nesting site failed. The female was infrequently seen and probably was incubating. This is the first definite record of the occurrence of the species in Manitoba.

On January 14, 1942, I received a letter from Mrs. C. A. Moors of Sanford, Manitoba, stating that a Red-bellied Woodpecker had been a daily visitor to her feeding station for about six weeks. On January 24, accompanied by L.T.S. Norris-Elye, A. H. Shortt, and R. D. Harris, I drove

to Sanford, which is about 22 miles south-east of Winnipeg, on La Salle river. We located the bird without difficulty in the trees close to the feeding station, and all had an excellent view of it. It was a male almost in complete adult plumage but with ashy-grey still showing on the crown. The rest of the head and nape was red. From Mrs. Moors' description of the plumage earlier in the winter when the head was darker and showed less red, it is evident that the present record is of an immature male which is just now assuming adult plumage.

It is worthy of note that Dr. T. S. Roberts (*Birds of Minnesota*, Vol. 1, p. 672) records that the first record for Minnesota came from the extreme south-eastern portion of the State in 1893, and that by 1930 a few pairs had become firmly established in the vicinity of St. Paul and Minneapolis. It is now regarded as a fairly common resident in south-eastern Minnesota.—B. W. CARTWRIGHT.

**A BACKYARD BEAVER.**—In October, 1936, a beaver was captured by park rangers to be used as a model for pose, structure and color during the preparation of animals for a habitat group in the National Museum of Canada. The group, as planned, will have a painted background, beavers engaged in wood cutting, and trails, canals, a dam and a lodge. The required number of animals and a ton and a half of beaver-cut wood were obtained in Algonquin Park.

An account of the live beaver, fat and healthy after four and a half years in confinement out of doors, may be of interest. Judging by its size in 1936 and its subsequent growth, this animal, a female, was probably about eighteen months old when captured. It now weighs alive forty-five pounds. Not knowing how a beaver would thrive in captivity, I made an enclosure (which proved too small) measuring two and one-half feet by five feet, with sheet-metal bottom, sides of fox fence, a lift-up cover, and at one end a metal-lined house. Apparently attempting to shut out wind and light, the beaver wove sticks in the fence, so I covered the sides and top with canvas. A large removable pan is used for water. When fresh water is placed in the pan the beaver gets in and drinks from one corner while releasing excrement in another. Obviously beavers defaecate in water, thus accounting for the absence of droppings on land.

The beaver enjoys having its ears and back scratched. When annoyed it makes quite a noise by blowing, and when further irritated it chatters its teeth like some other rodents and may lower

its head and charge with considerable force. On occasion the beaver has been let out of its enclosure to be photographed, and when being herded back in with a broom it evidently becomes frightened and sheds tears and makes a sound that if produced by a human would be described as whimpering. At the approach of feeding time in the evening it moans or moos.

The beaver is fed carrots, potatoes, apples, bread and wood. The bread is often eaten before the vegetables, and, when offered aspen poplar, balsam poplar, birch, cherry, willow and maple, aspen poplar is first choice. Ash and basswood are not liked. Twigs to the size of a pencil are nipped off, held in the hands and fed into the mouth, end first. Thus both bark and wood are swallowed, and as a consequence the droppings contain a considerable amount of coarse sawdust. Apparently the wood is not digested. The remainder of the wood is cut in lengths to facilitate handling. Sections up to one inch in diameter are held in the hands, with the inner fingers on top and the outer finger underneath serving the purpose of the human thumb. The wood is turned as the teeth, starting at one end, remove the bark, and when the opposite end is reached the stick is white and smooth without a tooth-mark. The bark is taken from larger sections of wood as they lie on the ground. When larger sections are cut in two, chips up to four inches long, one inch wide and three-eighths of an inch thick are removed by cutting at each end and lifting out. In the fall of the year shreds of wood up to four inches long, one-fourth inch wide and one-eighth inch thick were made in a similar way and carried into the house for a nest. More than six cubic feet of this material was placed on the floor and packed around the walls. The beaver arranged the shredded wood with the mouth and hands, and moved a mass by holding it on the arms, against the chest, under the chin and shoving it, sometimes, for a short distance, free of the floor.

Graceful in water, the beaver is surprisingly strong but rather clumsy on land. It has two gaits, a slow walk with the tail dragging, and a ludicrous gallop at a speed of perhaps eight miles an hour. This latter gait is not maintained for more than fifty yards, as it is apparently unnatural for so bulky a creature and is obviously tiring.

Young beavers, like young skunks, are perhaps friendly and playful, but this particular beaver, though unafraid, is unfriendly and stolid.—CLYDE L. PATCH.

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*We ask the Officers, and more particularly the Secretaries, of all the Affiliated Societies to assist us in our task of building up the circulation of this periodical. By securing every member as a subscriber we can make it truly one of the leading Natural History publications of America.*

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## CONTENTS

	PAGE
Editorial.....	47
Observations on the Raising of Waterfowl in Southern Ontario. By H. G. Mack.....	48
Birds of Leeds County, Ontario (concluded). By G. C. Toner, W. E. Edwards and Murray W. Curtis.....	50
Canadian Voles of the Genus <i>Phenacomys</i> with Description of Two New Canadian Subspecies. By R. M. Anderson.....	56
Notes on the Fauna of Bruce Peninsula, Manitoulin and Adjacent Islands. By M. Y. Williams.....	60
Book Reviews:—	
American Plant Names. By A.E.P.....	62
Outline of the Fungi. By J. W. G.....	62
Plant Galls and Gall Makers. By A.W.A.B.....	62

The official publications of THE OTTAWA FIELD-NATURALISTS' CLUB have been issued since 1879. The first were *The Transactions of the Ottawa Field-Naturalists' Club*, 1879-1886, two volumes; the next, *The Ottawa Naturalist*, 1886-1919, thirty-two volumes; and these have been continued by *The Canadian Field-Naturalist* to date. *The Canadian Field-Naturalist* is issued monthly, except for the months of June, July and August. Its scope is the publication of the results of original research in all departments of Natural History.

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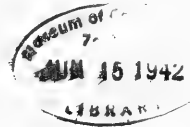
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## EDITORIAL



The strong suggestion has been made that editorial comment appear from time to time in *The Canadian Field-Naturalist*. It is with extreme hesitation that this practice is therefore being attempted, in the full knowledge that, in taking up valuable space otherwise devoted to original articles, it bears the onus of justifying itself. Whether such justification does in fact exist, is for our subscribers to decide. Had it not been for the appearance of a subject particularly worthy of attention, this essay into the editorial realm would never have been inaugurated.

We refer to the first appearance of the Transactions of the CANADIAN CONSERVATION ASSOCIATION. Without any doubt this event merits an acclamation, for a début which in its intellectual vigour recalls that of Pallas Athene, who sprang fully-armed from the head of Jove. The initial annual meeting was held last May at London, and by the time these lines have been published the second meeting will have taken place at Montreal.

First, a word on the Association. Its primary purpose has been notably phrased, and deserves special citation: "to promote the welfare of all Canadians by encouraging the conservation and best use of our natural resources, more particularly those of soil and water and the life that these support". Qualifications for membership are designed to include all those definitely interested in the conservation of our natural resources, and who would be judged as adding dignity and strength to the Association. Funds are derived from a modest membership fee, along with special grants for specific purposes such as the printing of the Transactions, the cost of which was generously met this year by the London Life Insurance Company. It is particularly appropriate that the first president of the Association is Professor JOHN D. DETWILER, whose enthusiastic and persistent advocacy of soil

conservation was one of the prime moving causes of its formation.

And now for the Transactions of the first annual meeting. They are at once revealed as forming a report of extremely high calibre. The authors of the papers contained therein are distinguished leaders in their respective fields. Of these men, three are officers of the Dominion Government, seven are on the staff of Canadian Universities, and four are agents of private enterprises. In the last group, one cannot fail being impressed by the work of Ducks Unlimited, and of the Hudson's Bay Company. All the basic aspects of conservation: soils, forestry, grassland problems, water conservation, fisheries, and wildlife administration, are covered by the constituent articles. It would be hard to single out any individual papers as of outstanding merit from the general high standard, but special mention should be made of the outline of policy contributed by Dymond, the encouraging report of wildlife administration by Allan, and the well-balanced account of forest conservation and development by Harrison.

The undoubted strength of this report seems to reside in its high content of factual information, in its grasp of matters of policy, and in its appreciation of immediate administrative problems. And it is inspiring because it can show where actual progress has been made in conservation, notably in the rehabilitation of prairie lands, the protection of wildfowl, and the revival of muskrat and beaver.

Throughout the whole report there runs the theme of urgency. This urgency, which all true conservationists feel, is not only in the present, when demands on diminishing resources are more intense than ever before; but also against that time when returning servicemen of our own nation, and possibly new citizens from older countries, look to Canada as the land of promise.

## OBSERVATIONS ON THE RAISING OF WATERFOWL IN SOUTHERN ONTARIO

By H. G. MACK

*Guelph, Ontario*

MANY THOUSANDS of people, the world over, derive a keen enjoyment from the propagation of wild ducks, geese and swans. This hobby is far more extensively followed than is generally known, and in addition to the pleasure and knowledge it imparts it will in all probability be the means of saving some species from extinction in the years to come.

Most varieties of waterfowl have been and are being successfully propagated in confinement. My experience, over a period of fifteen years, has largely been with geese,—to me the most interesting of all. This paper makes no pretense of being scientific, but may be of interest to those whose inclination leads them in the same direction as mine.

It is generally accepted that, in the wild, geese remain mated for life. The keeping of wild-caught stock, even in apparently attractive quarters, usually means disappointment from the standpoint of reproduction, although the birds may appear to be happy and contented. The vast majority of wild-caught geese never breed in captivity. But the exception—those that do mate and from which young are successfully reared—will continue to breed so long as conditions are satisfactory to them. And it is from such rare beginnings that what is known as “hand-reared” birds have become available. Most of such reared wild geese, when mature, will breed readily under suitable conditions.

In my own experience, I have been successful in securing fertile eggs from one pair of wild-caught European Graylag Geese, but it was twelve years before they condescended to try raising a family.

The minimum essential conditions for breeding wild geese in captivity, I believe, are water, green-feed and privacy.

**WATER.**—The size of the body of water required is not necessarily large. However, it should be clean, flowing, and in some parts at least two

feet deep, as geese mate in the water and this depth seems essential for mating.

**GREEN FEED.**—If aquatic plants are present in the water, so much the better. A gravelly bottom will supply natural grit. Natural food is always better than artificial food, but it is seldom possible to depend very much on natural aquatic food. Grass is as essential to geese as to most domestic animals, and to some varieties to a greater extent than others. Lawn cuttings, fed on the water where they will keep fresh longer, is a good addition to growing greens within the enclosure. In winter I feed mangolds, a readily accepted source of greens. And, of course, mixed grain is fed.

**PRIVACY.**—An enclosure for wild geese should be large enough to offer variety—openings, shade, shrubs, etc., so that the birds can move around and take an interest in their quarters. A number of pairs may be kept in the same enclosure, provided there is room for the less dominant or smaller varieties to keep out of the way of larger or more aggressive birds.

When the freeze-up comes in the fall, I keep all my waterfowl in a long, narrow, temporary “yard” leading from the barn to a section of a pond. The ice is kept cut in order that they may have access to the natural pond water through a hole about fifteen feet across. The barn floor is kept covered with fresh straw, and the old straw is spread out in a strip from the door to the opening in the ice, to provide a place for the birds to rest and keep their feet out of the snow. They are driven into the barn every night, not because they cannot stand the cold, but as a protection from owls or other nocturnal predators.

About the turn of the year, mated pairs begin to show symptoms of lovemaking. This increases steadily as spring approaches, and is evidenced by the gander keeping close to the goose, stretching his neck and honking. Sometimes he will caress the goose's back and neck. And he becomes more pugnacious as the sun gets stronger.





Canada Geese, Eden Crown Game Preserve, Ontario

The photograph also includes European Graylag, White-fronted, Sebastapol, and Egyptian Geese



Mute Swans, Eden Crown Game Preserve, Ontario

As soon as there is open water I divide the birds into flocks, keeping those of about the same size together. If there is some fighting, the birds will be about evenly matched, no damage will be done, and they will soon settle down to their own "territories".

I usually let the geese incubate their own eggs. To protect the eggs from crows, I encourage each pair to nest in a barrel placed horizontally on a raised scaffold with a runway to the entrance, and they quickly learn to accept these nesting sites. Since adopting this practice, I have seldom lost eggs to crows; whereas if the geese nest on the ground, I find it difficult to avoid losses.

When the young are hatched, I find it advisable to move the parents with their family into a special temporary pen with good grass, where their feeding can be controlled. For geese, with grass in the pen, I feed a good grade of game "starter" for a few weeks and then switch to game growing mash, usually commercial turkey mash. This is all the whole family gets until the young are three-quarters grown when they are turned into the large pens with other geese. I found that when I did not separate them, there was a tendency for the parents to tire the young by "travelling" them too much. It was also impossible to be sure that they got the right food in sufficient quantities. The result was the loss of young birds reaching sometimes quite high proportions.

**PREDATOR CONTROL.**—Much has been written on this subject, and I must confess that I do not agree with most of it. I have had plenty of losses, some of which are irreplaceable under present conditions. But I no longer believe in pole traps or permanent sets, owing to the wanton destruction of many innocent victims. My biggest losses have come from great horned owls, mink, coon, snapping turtles and crows, in the order named.

Small birds, like Wood Ducks, Mandarin Ducks, Teal, etc., should be kept in predator-proof pens. In the wild, they can look after themselves quite effectively, but in confinement must depend on their keeper. It is not fair or reasonable to keep these small birds in an enclosure the predator can enter.

Owls, mink and coon will readily take even the largest wild goose, but if smaller and more easily captured prey are available, they will naturally take them first. I keep plenty of Grey Mallard

Ducks in all enclosures. If an owl kills a duck I usually have him in a trap the next night, as they regularly return to their kill the night following. If the kill has been made by any other predator, it is usually possible to determine the culprit and take proper proceedings. The sacrifice of a Mallard Duck to save a more valuable bird is well worth while.

However, once a great horned owl, mink, weasel, wild house-cat or other predator makes a kill in a pen of confined birds, it is necessary to act quickly and effectively. Otherwise the flock will be depleted, and the remaining birds will be so upset that a whole season's good work may be lost.

Shortly after acquiring my wooded property of a few acres along the Speed River, five miles from Guelph, Ontario, I was instrumental in having it and the surrounding farms declared the Eden Crown Game Preserve by Order-in-Council. With no shooting or trapping, all wild life has since increased, and is now well representative of this part of Ontario. In recent years there has been a noticeable increase in deer, foxes and black squirrels. Muskrats reached a high point three years ago but have since declined appreciably. Local Ruffed Grouse do not seem to be markedly affected by the cycle, their numbers appearing to be about the same from year to year.

After the summer moult I allow my Canada Geese and Mallard Ducks to fly until the freeze-up. Some ducks, of course, go south, but I have never had any geese leave me. It is a real thrill when a flock of 25 or 30 of these big birds take off for the upper stretches of the river, passing perhaps just a few feet overhead as they fight for altitude, calling all the time.

I liberated Wood Duck some years ago, and now wild Wood Duck breed every year on my place, and I have the satisfaction of seeing them throughout the season, in and out of my ponds and on the river. Mallards and Black Ducks are with me in the wild throughout the season, and in the fall it is a common sight to see great flocks on the river and in the air. The feed they eat is a trifle compared with the pleasure of having them, and the knowledge that if they survive migration they will be back next year.

The hobby of raising waterfowl need not be expensive. It can be enjoyed by everyone, young or old. Even a small pond in the back yard with a pair of Wood Duck or Mandarin Duck can be a never-ending delight. Their fidelity and little intimate habits are an object lesson to us all!

## BIRDS OF LEEDS COUNTY, ONTARIO

By G. C. TONER, W. E. EDWARDS and MURRAY W. CURTIS

*Continued from page 44*

AMERICAN PIPIT. *Anthus spinoletta*.—This bird is probably more common than our records would show. Young (18) stated he had seen them in Leeds in October.

BOHEMIAN WAXWING. *Bombycilla garulla*.—An uncommon winter visitor, irregular in its appearance in the county. Young (18) mentioned seeing it in winter and one of us, (W.E.E.), watched a small flock for some time on March 25, 1938, near Landon's Bay.

CEDAR WAXWING. *Bombycilla cedrorum*.—The Cedar Waxwing is common throughout the lighter wooded areas of the county.

Charleston Lake: Young (18) found a nest, June 14, 1899, containing two eggs. He believed it to be a nest of the Bohemian Waxwing, basing his identification on the size of the eggs. However, there is a wide variation in the eggs of the Cedar Waxwing and it is probable that this is the species he found. (G.C.T.)

Conran Island: W. J. Miller noted Cedar Waxwings near here June 25, 1939. (G.C.T.)

Gananoque: A small flock of waxwings visited the garden, May 27, 1936, and fed for some time on the petals of the apple blossom. (G.C.T.)

South Lake: I watched young birds being fed by their parents on July 29, 1937. (G.C.T.)

NORTHERN SHRIKE. *Lanius borealis*.—This shrike is an uncommon winter visitor. On March 18, 1938, one of us, (G.C.T.), noted a shrike on a fence wire while driving into Gananoque. The car was turned around and stopped about fifty feet from the bird which was examined with 8x glasses. The vermiculations on the underparts were quite conspicuous. Young (18) stated the Northern Shrike was uncommon in eastern Ontario in fall and winter.

MIGRANT SHRIKE. *Lanius ludovicianus*.—The Migrant Shrike is common in Leeds, breeding in many localities.

Athens: Young birds have been noted on several occasions and a young male was collected, August 21, 1939, now in the R.O.M.Z. (M.W.C.)

Lansdowne: R. M. Johnson, telephone lineman, told me of finding a nest with young while cutting roadside trees. The small tree, containing the nest, when cut, was set up in another clump that was out of the way. The adult shrikes accepted the change and stayed

with the young until they were ready to fly. (W.E.E.) C. J. Young collected a set of five eggs on April 24, 1895, that are now in the N.M.C. Another set was collected by C. K. Clarke, April 28, 1890, that are now in the R.O.M.Z. (G.C.T.)

South Lake: On June 13, 1937, a nest was found with four young almost ready to fly. It was built in a clump of birch alongside the road, and the young shrikes were very noisy, sounding much like young grackles. Two days later they had left the nest and were being fed by their parents in a nearby hedgerow. (G.C.T.)

Newboro: W. J. Miller found a nest with five eggs near the Bog on May 7, 1934. This nest was being rebuilt on May 5, 1935. (G.C.T.)

STARLING. *Sturnus vulgaris*.—"At Athens starlings were first noted about 1924 when four or five individuals were present. Each year since then the increase has been enormous and huge flocks are now to be seen each fall. On September 14, 1928, I observed about five hundred chivvying a small hawk. They would surround it in a dense mass, striking and buffeting with their wings. Sometimes their formation resembled a huge ball with the hawk in the centre, at other times the flight resembled a tear drop with the point just over the trees. On October 1, 1938, I saw another flight of the same kind while hunting at Wiltsie lake. This flight was most interesting and amusing to watch. Sometimes they flew in a long ribbon, one end would turn and the whole line would swing as boys do when they 'snap the whip.' At other times they would fly in the ball formation mentioned above. Starlings are probably beneficial from the standpoint of food habits but as they occupy nesting sites of more desirable species, such as tree swallows and bluebirds, the harm they do may outweigh the good. They are certainly a great nuisance when they roost in church belfries or in buildings in cities." (M.W.C.)

Dr. H. F. Lewis' "A distributional and economic study of the European Starling in Ontario" (*U. of Tor. Studies, Biol. Series* No. 30, 1927) states that the earliest record of the starling in Ontario is that the birds seen in July 1919 at Hudson Point by H. G. Breakell.

YELLOW-THROATED VIREO. *Vireo flavifrons*.—This vireo may be more common than one would suspect. There is an early record by Young (18) who

stated he found it at Rockport and believed it was nesting in the locality.

Brockville: W. J. Miller noted three birds on May 20, 1929, in tall shrubs and weeds in St. Lawrence park. (G.C.T.)

**RED-EYED VIREO.** *Vireo olivacea*.—The Red-eyed Vireo is abundant, breeding throughout the county. Athens: A common summer resident. (M.W.C.) Bateau Point: This vireo nests regularly. In 1928 a nest was hung in the crotch of an oak about three feet from the cottage window. (W.E.E.)

Gananoque: The song of this vireo can be heard almost anytime between June 1 and July 15 from the shade trees along the streets. (G.C.T.)

Charleston Lake: C. K. Clarke collected a set of two eggs on June 14, 1899, that are now in the R.O.M.Z. (G.C.T.)

**PHILADELPHIA VIREO.** *Vireo philadelphicus*.—The status of this bird is in doubt. Young (18) stated that he found it breeding at Lansdowne, but Baillie and Harrington (2) do not include the record and in a letter, J. L. Baillie states that it is fairly evident that Young was mistaken. It is best to regard the species as hypothetical until specimens are taken.

**WARBLING VIREO.** *Vireo gilvus*.—The Warbling Vireo is common throughout Leeds. It nests in shade trees and in mature woods.

Athens: A nest with young was found in 1927. (M.W.C.)

Bateau Point: Very common though I have not as yet found nests. (W.E.E.)

Brockville: W. J. Miller notes this bird as common, and while he has no records of nests, he noted an adult feeding a juvenile on July 9, 1928. (G.C.T.)

**BLACK AND WHITE WARBLER.** *Mniotilta varia*.—This warbler is a common breeder in suitable areas throughout the county. It seems to prefer groves of scattered evergreens along the edges of watercourses.

Athens: A common and easily recognized species most often seen in spring. (M.W.C.)

Brockville: W. J. Miller has given me spring and summer records. (G.C.T.)

Lansdowne: Young found a nest on June 24, 1894, containing four infertile eggs and one young bird. (18)

**NASHVILLE WARBLER.** *Vermivora ruficapilla*.—The Nashville Warbler is a summer resident of Leeds. Young (18) found it breeding along the St. Lawrence but did not give the locality.

Beverly Lakes: C. L. Broley states that this vicinity. (G.C.T.)

**PARULA WARBLER.** *Compsothlypis americana*.—The Parula Warbler is usually regarded as a migrant in this region, but summer sight records suggest that it may breed.

Beverly Lakes: C. L. Broley recorded the Parula on June 15, 1938, in a tamarack swamp at the northwest corner of the lower lake. On June 3, 1939, he showed M.W.C. and myself a parula in the same swamp. The bird was watched for nearly a quarter of an hour. (G.C.T.)

Charleston Lake: W. J. Miller has the following notes on this bird: "I identified this warbler while camping on Buck Island, July 26, 1929. At that time I did not collect and so did not secure the specimen, but I am positive my identification was correct. I had the bird in sight for nearly an hour, sketched it and compared it with the pictures in my books. I was so surprised at the sight of a Parula that I checked and rechecked its markings while the bird was in sight." (G.C.T.)

**YELLOW WARBLER.** *Dendroica aestiva*.—The Yellow Warbler is an abundant summer resident that arrives each spring when the dandelions are in bloom. It breeds throughout Leeds.

Brockville: W. J. Miller has breeding records of the Yellow Warbler. (G.C.T.)

Gananoque: Two broods were raised in a large maple in front of my residence in 1938. (G.C.T.)

**MAGNOLIA WARBLER.** *Dendroica magnolia*.—This warbler is usually noted only as a migrant, but C. L. Broley has supplied summer records of the species at Beverly Lakes.

**CAPE MAY WARBLER.** *Dendroica tigrina*.—The Cape May Warbler was identified by W. J. Miller and Rev. A. F. C. Whalley in Grant's woods, west of Brockville on May 26, 1929. Mr. Miller states that he has since noted the birds on several occasions, and as the males are quite distinctive it is unlikely that he has confused this species with other warblers.

**BLACK-THROATED BLUE WARBLER.** *Dendroica caerulescens*.—The Black-throated Blue is common as a migrant and it may be found breeding in this county when more intensive work is done.

Ivy Lea: These warblers were common at the International bridge on May 24th, 1938. (G.C.T.)

Temperance Lake: W. J. Miller noted these warblers as common on May 31, 1926. (G.C.T.)

**MYRTLE WARBLER.** *Dendroica coronata*.—The Myrtle Warbler is a common spring and fall migrant. A few remain to breed in the county.

Athens: A common migrant in spring and fall. (M.W.C.)

Beverly Lakes: C. L. Broley found this warbler breeding in 1928 and in 1929. (G.C.T.)

Gananoque: While trapping small mammals on October 5, 1934, a myrtle warbler was caught. The skin is now in the R.O.M.Z. (G.C.T.)

Hudson Point: Observed on July 18, 1926, by C. H. D. Clarke.

**BLACK-THROATED GREEN WARBLER.** *Dendroica nigrescens*.—This warbler appears in the spring migration quite commonly and has been noted in the fall. It breeds within the limits of Leeds County.

Athens: I have a number of spring records. (*M.W.C.*)

Beverly Lakes: C. L. Broley mentions this bird as breeding here in 1928 and 1929. (*G.C.T.*)

Brockville: W. J. Miller noted this species on May 26, 1928. (*G.C.T.*)

Deer Island: Young found a nest in July, 1898. (*18*).

Hudson Point: Observed in July, 1926, by C. H. D. Clarke.

**CERULEAN WARBLER.** *Dendroica cerulea*.—The Cerulean has been found in summer in Leeds and it is probable that it breeds within our limits. Broley (*6*) gave an account of the summer occurrence of this bird near the Beverly Lakes.

**BLACKBURNIAN WARBLER.** *Dendroica fusca*.—The Blackburnian Warbler is often noted in May but seldom at any other time. There are many sight records for Leeds as the males are conspicuous in spring.

Beverly Lakes: C. L. Broley noted one feeding young on July 7, 1927, in the tamarack swamp at the northwest corner of the lower lake. (*G.C.T.*)

Hudson Point: C. H. D. Clarke observed a pair of this species feeding a young Cowbird in July, 1926.

**CHESTNUT-SIDED WARBLER.** *Dendroica pensylvanica*.—The Chestnut-sided is not uncommon during the spring and fall migrations. A few remain to breed within the limits of the county.

Beverly Lakes: C. L. Broley has breeding records from here. (*G.C.T.*)

Lansdowne: Young found a nest on June 3, 1896, with four eggs. (*18*).

**BAY-BREASTED WARBLER.** *Dendroica castanea*.—This warbler is an uncommon migrant in Leeds county that usually breeds much farther north.

Hudson Point: Observed by C. H. D. Clarke in July, 1926.

**BLACK-POLL WARBLER.** *Dendroica striata*.—This warbler is a rarely noted migrant in Leeds. We have very few records, but as the species lingers only a day or so when passing through they could very easily be overlooked.

Brockville: W. J. Miller identified a Black-poll in Grant's Woods on May 24, 1928. These birds were again noted in the same woods on May 20, 25 and 26, 1929. (*G.C.T.*)

**PINE WARBLER.** *Dendroica pinus*.—This warbler is a common spring and fall migrant, though we have very few records.

Westport: L. L. Snyder recorded Pine Warblers on August 1, 1934. (*G.C.T.*)

Thousand Islands: G. H. Richardson noted the Pine Warbler in July, 1930. (*G.C.T.*)

Hudson Point: Observed by C. H. D. Clarke in July, 1926.

**OVENBIRD.** *Seiurus aurocapillus*.—The Ovenbird is a common summer resident throughout the county, breeding in mature beech and maple woods.

**NORTHERN WATER-THRUSH.** *Seiurus noveboracensis*.—The Water-thrush is often noted in spring and is common in summer. Wet woods and alder swamps along streams are its favorite haunts.

Thousand Islands: Young found a nest in July, 1894, on one of the islands. (*18*)

**MOURNING WARBLER.** *Oporornis philadelphia*.—This warbler is sometimes noted as a migrant in the spring, and there are one or two records that would seem to show that it breeds within our limits.

Lansdowne: Young found a nest at this village on June 2, 1892. (*18*)

Hudson Point: C. H. D. Clarke found a pair feeding young on July 12, 1926.

**MARYLAND YELLOW-THROAT.** *Geothlypis trichas*.—The Yellow-throat is a common migrant that breeds occasionally within Leeds County.

Beverly Lakes: C. L. Broley found this warbler breeding in 1928 and 1929. (*G.C.T.*)

Gananogue: Yellow-throats were common over the Bluff on May 21, 1939. (*G.C.T.*)

Lansdowne: Young stated that he found nests of this species several times. (*18*).

**AMERICAN REDSTART.** *Setophaga ruticilla*.—The Redstart is common throughout Leeds, breeding in suitable locations.

Athens: Rather common in summer. (*M.W.C.*)

Blue Mountain: Redstarts noted on June 28, 1938. (*G.C.T.*)

Grippen Lake: On July 24, 1934, noted a pair on the east side of the lake. (*G.C.T.*)

Lansdowne: E. Beaupre collected a set of three eggs on June 9, 1896, that are now in the R.O.M.Z. (*G.C.T.*)

Hudson Point: C. H. D. Clarke found a nest with young in July, 1926. On July 18 the young had left the nest.

**ENGLISH SPARROW.** *Passer domesticus*.—This introduced species is common throughout the county, nesting in farmer's barns and around towns and villages. Sparrows will drive barn, tree and cliff swallows from their nests, but the purple martin is more than a match for them. We have seen martins taking possession of colony houses in which sparrows had their nests, throwing these out to make room for their own.

**BOBOLINK.** *Dolichonyx oryzivorus*.—The Bobo-

link is abundant in open meadows. The males are so strikingly marked that they are easily recognized, and we have sight records from everywhere in Leeds.

Athens: A common summer resident, nesting in meadows. (M.W.C.)

Gananoque: Very common in the open fields. Nests have been regularly reported. (G.C.T.)

MEADOWLARK. *Sturnella magna*.—The Meadowlark is an abundant summer resident of the open farmlands of the county, breeding wherever found.

RED-WINGED BLACKBIRD. *Agelaius phoeniceus*.—Every small cattail marsh will have a few pairs of Red-wings, while the larger marshes have many thousands.

Bateau Channel: This bird is abundant. I have photographs of nests, taken in 1938. (W.E.E.)

Gananoque Lake: Common and breeding in every marshy bay on the lake but particularly abundant on the Wiltsie creek marsh. (G.C.T.)

Halstead's Bay: Hundreds of Red-wings nest in the vegetation of the marsh. (G.C.T.)

Mallorytown Landing: I collected a specimen on April 18, 1938, now in the R.O.M.Z. (M.W.C.)

Waterton: S. C. Downing collected a set of two eggs on May 13, 1937, now in the R.O.M.Z. (G.C.T.)

ORCHARD ORIOLE. *Icterus spurius*.—This oriole appears to be an uncommon summer resident in the county. W. J. Miller noted these birds around Gananoque in the years 1922-25, where it was occasionally found nesting. F. E. Ferguson reports seeing an Orchard Oriole near Ivy Lea in 1938.

BALTIMORE ORIOLE. *Icterus galbula*.—The Baltimore Oriole is abundant throughout Leeds. When the leaves are off the trees, the pendant nests are quite conspicuous and give some indication of the number of breeding birds.

RUSTY BLACKBIRD. *Euphagus carolinus*.—The Rusty Blackbird is a common migrant, flocks of them being noted each spring and fall.

Athens: Small flocks visited this vicinity in October, 1936, 1937, 1938 and 1939. (M.W.C.)

Brockville: W. J. Miller examined a specimen shot on October 10, 1932. (G.C.T.)

Lansdowne: Young stated that large flocks arrive each October from the north. (18)

GRACKLE. *Quiscalus quiscula*.—Grackles are common summer resident, breeding throughout the county. The nest is usually built in conifers, preferably near a farm yard or in town and villages.

Athens: Three specimens collected September 29, 1938, are in the R.O.M.Z. (M.W.C.)

Harlem: A specimen in the R.O.M.Z. was taken on April 20, 1938. (M.W.C.)

COWBIRD. *Molothrus ater*.—The Cowbird is common everywhere in the county.

Athens: A specimen, collected April 4, 1938, is in the R.O.M.Z. (M.W.C.)

Bateau Point: An egg taken in 1927 from the nest of a Red-eyed Vireo. (W.E.E.)

Lansdowne: Young noted two Cowbirds in December, 1889. (18)

SCARLET TANAGER. *Piranga erythromelas*.—The Scarlet Tanager is an uncommon summer resident that occasionally breeds within the county limits.

Brockville: W. J. Miller noted two tanagers on May 24, 1928. (G.C.T.)

Grippen Lake: Pair observed in early July, 1934. (M.W.C.)

Hudson Point: A nest was found in 1925 by Hoyes Lloyd. (W.E.E.)

Lansdowne: Young found a nest in June, 1899. (18). Another nest was found by him on June 5, 1898, containing four eggs. (32)

Beverly Lakes: On June 3, 1939, watched a male Tanager for several minutes in the larch swamp at the north end of the lower lake. (G.C.T.)

ROSE-BREADED GROSBEEK. *Hedymeles ludovicianus*.—The Rose-breasted Grosbeak is not uncommon in the wilder portions of the county. Young (18) stated a few remain to breed and other nesting records are known.

Athens: On June 24, 1927, a nest of this grosbeak was found, containing four eggs. (M.W.C.)

Beverly Lakes: C. L. Broley states that there are a few of these grosbeaks here each year. (G.C.T.)

Gananoque: On June 21, 1939, a pair were noted on the Bluff. (G.C.T.)

Junetown: I have noted these birds a number of times in the broken country between here and Charleston Lake. (G.C.T.)

Leeds County: Ed. Beaupre found a nest with one egg and two young on June 11, 1896. He did not mention the locality. (G.C.T.)

INDIGO BUNTING. *Passerina cyanea*.—This bunting is an uncommon summer resident, probably breeding, but so far we have not found nests nor have we seen young birds.

Beverly Lakes: C. L. Broley regards this bird as common in this area. (G.C.T.)

Charleston Lake: This species has been noted here in summer. (M.W.C.)

Hudson Point: Observed by C. H. D. Clarke in July, 1926.

EVENING GROSBEEK. *Hesperiphona vespertina*.—We have numerous winter records for this grosbeak from many parts of the county, particularly where there are groves of Manitoba maples. The species may remain in Leeds to breed. Baillie

(*Can. Field-Nat.*, 1940, LIV: 15-25) mentioned a summer record from Leeds and also recorded August birds on Grindstone Island, just over the line in New York State.

Athens: Small flocks of these grosbeaks have been noted for several winters past. (*M.W.C.*)

Gananoque: A flock of about twenty birds remained most of the winter of 1937-38 in and about the town. (*G.C.T.*)

Brockville: W. J. Miller has given me numerous winter records from here. (*G.C.T.*)

**PURPLE FINCH.** *Carpodacus purpureus*.—In the woodlands of the county Purple Finches are not uncommon, breeding wherever they are found.

Benson's Island: A pair of these finches were conspicuously noisy in the shrubbery, May 25, 1938. I was told they nested each year on the island. (*G.C.T.*)

Gananoque: On July 18, 1937, noted a pair feeding young on the Bluff. (*G.C.T.*)

**PINE GROSBEAK.** *Pinicola enucleator*.—This grosbeak is a rare winter visitor in Leeds, appearing some years and absent in others.

Athens: These birds were noted in January, 1927, in January and December, 1928, and in January and February, 1938. (*M.W.C.*)

Gananoque: A pair of Pine Grosbeaks were noted each day from February 20 to February 26, 1938. (*G.C.T.*)

Lansdowne: Young noted Pine Grosbeaks in March, 1895. (18)

**HOARY REDPOLL.** *Acanthis hornemanni*.—The Hoary Redpoll is included in the list since Young (18) stated he observed a small flock at Lansdowne in March, 1897.

**REDPOLLED LINNET.** *Acanthis linaria*.—This redpoll is an occasional winter visitor.

Athens: Redpolls noted in February, 1928, in March, 1937, and a flock of twenty on January 8, 1939. On February 22, 1939, a female was collected and on March 8, 1939, a male and female were taken. These specimens are now in the R.O.M.Z. (*M.W.C.*)

Bateau Point: Six Redpolls were noted March 4, 1938. (*W.E.E.*)

**PINE SISKIN.** *Spinus pinus*.—The Pine Siskin is an erratic winter visitor that appears at intervals.

Athens: Noted these birds in December, 1932, and in January, 1938. (*M.W.C.*)

Gananoque: W. J. Miller noted Siskins on March 24, 1933. (*G.C.T.*)

**AMERICAN GOLDFINCH.** *Spinus tristis*.—The Goldfinch is an abundant summer resident, breeding throughout Leeds.

Athens: I have a very late breeding record of this species. A nest with four eggs, female incubating, was found on September 24, 1926. A specimen was collected on February 14, 1939, now in the R.O.M.Z. (*M.W.C.*)

Brockville: W. J. Miller notes this bird as common in summer. (*G.C.T.*)

**RED CROSSBILL.** *Loxia curvirostra*.—There are

several records for this bird in the county, but it should be regarded as an uncommon visitor. Young (18) noted a pair at Lansdowne in April, 1898, and W. J. Miller informs us that H. Halladay saw a flock of seven near Lyndhurst in January, 1939.

**WHITE-WINGED CROSSBILL.** *Loxia leucoptera*.—The R.O.M.Z. has two specimens of the White-winged Crossbill, collected by R. T. Anderson at Newboro in December, 1896. Young (18), (34), noted crossbills of this species in the Thousand Island region in April, 1897.

**EASTERN TOWHEE.** *Pipilo erythrophthalmus*.—The Towhee is not uncommon in spring and fall in Leeds. It is known to breed within our limits.

Athens: Noted a Towhee on May 10, 1937. They are unusual here. (*M.W.C.*)

Brockville: W. J. Miller saw a pair in the woods west of the town on June 9, 1938. (*G.C.T.*)

Lansdowne: Young noted it as breeding in this vicinity. (18)

Rockport: A pair of Towhees noted on May 24, 1934. (*G.C.T.*)

**SAVANNAH SPARROW.** *Passerculus sandwichensis*.—The Savannah Sparrow is a common summer resident throughout the county.

Athens: A specimen in the R.O.M.Z. was taken April 5, 1938. (*M.W.C.*)

Yonge's Mills: A nest with three eggs found on July 13, 1934. (*G.C.T.*)

**VESPER SPARROW.** *Pooecetes gramineus*.—This sparrow may be found breeding almost anywhere in the county.

Athens: A specimen in the R.O.M.Z. was collected on April 14, 1938. (*M.W.C.*)

Gananoque: W. J. Miller found a nest near the R.C. cemetery on May 15, 1924. (*G.C.T.*)

Plum Hollow: A nest with five eggs was found in June, 1938. (*M.W.C.*)

**SLATE-COLORED JUNCO.** *Junco hyemalis*.—The Junco is a common spring and fall migrant, often appearing in great flocks in April and remaining for several days. It is a possible breeder but we have no nesting records. Young (18) stated he had looked for nests in suitable localities but failed to find them.

Athens: A specimen collected on April 13, 1938, is now in the R.O.M.Z. (*M.W.C.*)

**TREE SPARROW.** *Spizella arborea*.—The Tree Sparrow is a migrant from the north that does not go very far south of our borders to winter. Some remain in Leeds throughout this season.

Athens: These sparrows are usually noted here in November and December. The R.O.M.Z. has specimens taken April 14, and October 19, 1938. (*M.W.C.*)

**CHIPPING SPARROW.** *Spizella passerina*.—This bird is familiar to everyone. It nests in gardens and



orchards, raising two or more broods each year.

Athens: Nests noted in 1937. (M.W.C.)

Gananoque: A brood was raised in an ornamental spruce in 1937 and again in 1939. (W.E.E.)

FIELD SPARROW. *Spizella pusilla*.—This sparrow is occasionally noted in Leeds. It breeds in certain areas but is almost unknown in others.

Beverly Lakes: C. L. Broley regards the Field Sparrow as common in this vicinity. (G.C.T.)

Junetown: Ed. Beaupre took a set of eggs on May 14, 1901. (2)

Westport: Nest with three young found about August 1, 1934, by L. L. Snyder. (2)

Mackintosh Mills: Specimen in the R.O.M.Z. collected on April 19, 1938. (M.W.C.)

Hudson Point: Observed by C. H. D. Clarke in July, 1926.

WHITE-CROWNED SPARROW. *Zonotrichia leucophrys*.—The White-crown is noted only as a migrant in spring and fall.

Athens: The bird is not uncommon in May and September. (M.W.C.)

Brockville: W. J. Miller noted these sparrows on April 22, May 5, and May 12, 1938. (G.C.T.)

Gananoque: On May 12, 1934, twelve White-crowns were noted on the Bluff. (G.C.T.)

WHITE-THROATED SPARROW. *Zonotrichia albicollis*.—The White-throat is abundant in spring when its call can be heard from every copse. It is possible that it may breed in Leeds.

Athens: White-throats can be heard singing in a nearby swamp every evening in summer. While I have not found nests I am sure they breed here. (M.W.C.)

Brockville: W. J. Miller has given me many spring records for this bird. (G.C.T.)

Hudson Point: Observed by C. H. D. Clarke in July, 1926.

FOX SPARROW. *Passerella iliaca*.—The Fox Sparrow is a migrant, mainly noted in spring. One of us, (G.C.T.), in an earlier paper (25) stated it nests in this region but this record may be erroneous. It was based on the occurrence of late spring birds, June 24, 1934, at Dog Lake, just over the county line in Frontenac.

SWAMP SPARROW. *Melospiza georgiana*.—This sparrow seems to be uncommon. We have only one sight record from Hay Island, near Gananoque, but the birds are probably more abundant than this would indicate.

SONG SPARROW. *Melospiza melodia*.—Song Sparrows arrive early in the spring and remain until October. They breed throughout the county.

Athens: A specimen taken on April 4, 1938, is in the R.O.M.Z. (M.W.C.)

Bateau Point: Nested in 1938, young were taken by an unknown predator. (W.E.E.)

Jones Creek: Nest with five young, almost ready to fly, found June 16, 1939, in tall grass on river bank. (G.C.T.)

LAPLAND LONGSPUR. *Calcarius lapponicus*.—This longspur is apparently an uncommon winter visitor. One of us, (W.E.E.), examined a Longspur shot in December, 1927, near Gananoque, but the specimen was not preserved.

SNOW BUNTING. *Plectrophenax nivalis*.—These birds are rather common winter visitors, arriving in December and remaining until March. They flock together, seldom remaining long in any one area.

Athens: A large flock, over 500 birds, remained until late spring, 1938. (M.W.C.)

Soperton: About 18 Snow Buntings were noted feeding on weed seeds on November 25, 1937. (G.C.T.)

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## CANADIAN VOLES OF THE GENUS PHENACOMYS WITH DESCRIPTION OF TWO NEW CANADIAN SUBSPECIES

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THE VOLES of the genus *Phenacomys* form a widely but sparsely distributed boreal group which superficially resembles the meadow mice (*Microtus*) in size, proportions and coloration. The peculiarities of these animals were overlooked until Dr. C. Hart Merriam had his attention called to a specimen collected by the late Dr. George M. Dawson, then Assistant Director (and later Director) of the Geological and Natural History Survey of Canada, on a basaltic plateau about twenty miles NNW of Kamloops, British Columbia, at an altitude of 5500 feet, on October 2nd, 1888, and sent to Dr. Merriam for determination. Dr. Merriam found that the specimen showed a remarkable combination of characters found in several different Arvicoline genera, but most closely allied to the Murine series. The molars are rooted as in the red-backed voles (*Clethrionomys*) and not growing from a persistent pulp as in *Microtus*, a character which is not obvious unless the teeth are taken out or a portion of the bony shell of the jaws removed. A peculiar character of *Phenacomys* dentition is the great depth of the reëntrant angles on the lingual (inner) side of the mandibular molars as com-

pared with the buccal (outer) side of these teeth, a character which readily distinguishes the genus at any age from all other *Microtinae*, and which has been found very useful in determining the composition of pellets and crop contents of raptorial birds. The white or pale grayish feet are also good field marks for specimens in full pelage and non-moulting condition. The species from east of the Rocky Mountains may also be recognized by the yellowish face, a character also shared by the rock vole (*Microtus chrotorrhinus*), a species which is not known to occur west of the Great Lakes region.

Dr. Merriam (1889) described a new genus, *Phenacomys*, based on a new species, *Phenacomys intermedius*, type of genus and species from near Kamloops, British Columbia, genotype and type now in National Museum of Canada, Catalogue of Mammals, No. 118; original number 780; immature. Careful search by Dr. Merriam through all the skulls of the subfamily Arvicolinae then in the U.S. National Museum, numbering several hundreds, brought to light five additional specimens, two alcoholics collected at Chimo, P.Q., by

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Lucien M. Turner in 1883-84, described by Merriam as *Phenacomys ungava* and *P. latimanus*; and one from Godbout, P.Q., collected by Napoleon A. Comeau, described in the same paper as *P. celatus*, and all now considered as synonyms by A. B. Howell (1926). Two broken skulls collected by Dr. Elliott Coues at Grosswater Bay, Hamilton Inlet, Labrador, in 1860, were provisionally referred to *P. celatus* by Merriam, and these with thirteen additional specimens from Hamilton Inlet and one from L'Anse au Loup, Strait of Belle Isle, described by Bangs (1900) as *P. celatus crassus*, have later been referred by Howell (1926) to *Phenacomys ungava crassus* (Bangs). *P. u. crassus* is a dull brownish form without buffy colour on under parts, with long, well-ridged skull and heavy rostrum, and condylobasilar length averaging more than 24 cm., considerably larger than *P. u. ungava*, the only other form known to occur east of Manitoba.

Owing to the boreal habitat of the representatives of this genus, both in the western mountains of North America and the northern forested region east of the mountains, as well as to the apparently local distribution of these animals, comparatively few specimens have come to light and the progress of our knowledge has been slow, although many more specimens have been obtained of the *intermedius* group, ranging from the Rocky Mountains westward, than of the *ungava* group, which ranges from the eastern foothills of the Rocky Mountains to the Atlantic coast of Labrador.

The rarity of these mammals precluded any common or vernacular name becoming generally accepted. The names "False Lemming Mouse" and "False Lemming Vole" have been proposed, based on the Greek combination in the generic name, meaning "cheat" or "deceiver" mouse, from the fact that "the external appearance of the animal gives no clue to its real affinities." Recent practice of American mammalogists favours using the generic name as the common appellation, since the animal has less affinity to the lemmings than to many of the voles, and generic names like rhinoceros, hippopotamus, geranium, rhododendron, phenacomys, etc., are as readily learned as inappropriate inventions in English or other languages.

Although *Phenacomys* prefers a cold, forested habitat, it has not yet been taken farther north than northwestern British Columbia: a little north of Rae, on the north side of Great Slave Lake: Churchill, Man.; and Chimo, P.Q., south of Hudson Strait. The genus has not been recorded from Alaska.

*Phenacomys ungava* was for many years considered to be restricted to the region broadly designated as "Labrador" and "Ungava", but over thirty years after the description of the species, W. E. Saunders and Morris M. Green took several specimens on the French River northeast of Georgian Bay, and from Franz, northeast of Lake Superior, and collectors for the Royal Ontario Museum of Zoology, Toronto, began to obtain occasional specimens from northern Ontario, including skulls from pellets of the American Hawk Owl, *Surnia ulula caparoch*.

The first Saskatchewan record, referred to *Phenacomys mackenzii*, was from the north side of Lake Athabaska in the extreme northwestern corner of the province; and in 1939 F. A. Banfield collected five specimens at Emma Lake, outside of the southeastern corner of Prince Albert National Park, which he referred to *Phenacomys mackenzii* (Banfield, 1941); and in 1941, J. Dewey Soper took a single specimen in Riding Mountain National Park, southwestern Manitoba, which showed sufficient peculiarities to justify some detailed studies.

A. Brazier Howell (1926, *op. cit.*, 29), in his discussion of *Phenacomys mackenzii* Preble (1902), stated that "The relationship of the present form lies with *ungava*, and it is thought that the differences between them will finally prove to be only subspecific in degree. This yet, however, cannot be demonstrated, and so it seems best to retain the binomial for the present."

More recent material which has come to hand seems to show that the great geographical gap existing at that time between *ungava* and *mackenzii* has been fairly well bridged by the taking of specimens at Favourable Lake, Kenora district, in northwestern Ontario, 500 miles northwest of the Franz records in Algoma district, approaching nearer to *ungava* than to any other form, but showing relationships to *mackenzii*; one specimen 300 miles southwest of Favourable Lake at Riding Mountain, Manitoba; five others still farther northwest near Prince Albert National Park, Saskatchewan; and two others at Battle Lake in central Alberta belonging to the prairie form and approaching *mackenzii* to some extent. The specimens from the central parts of the Prairie Provinces, while not taken in strictly prairie conditions, but from elevated portions of the prairie region, near the merging of the Great Plains with the northern forested regions, seem to justify the naming of a new geographical race which appears to show the connection between *Phenacomys ungava* Merriam (1889) and

*Phenacomys mackenzii* Preble (1902). The former having priority, the Mackenzie *Phenacomys* should stand as *Phenacomys ungava mackenzii* Preble.

The new form may be described as follows:

***Phenacomys ungava soperi*, new subspecies**  
Prairie *Phenacomys*.

*Type Specimen*.—Taken near Swanson Creek, in the middle of Section 34, Township 19, Range 17, Riding Mountain National Park, Manitoba; about ten miles east of Park Headquarters at Wasagaming, on Clear Lake, altitude 2016 feet; the wooded island plateau of Riding Mountain being 1100 feet above the general level of the surrounding prairie country. Female adult, No. 17131, Catalogue of Mammals, National Museum of Canada; Collected by J. Dewey Soper, June 5, 1941; original number 4358. Pregnant; 7 embryos, 8 mm. long.

*Diagnosis*.—Dorsal region from crown to base of tail dull *Drab* (Ridgway's Color Standards and Nomenclature, 1912), the hairs jet black at base but the black largely hidden by drab-coloured tips. Face pale *Ochraceous-tawny*, brightest at tip of nose, extending a little back of eyes and somewhat obscured by admixture of dusky hairs. Under parts light grayish in appearance, hairs black at base and tipped with white, fairly distinct from dorsal region, but with whitish encroaching a little at middle of flanks. Tail and feet with hairs mostly white, giving a whitish appearance where hairs are present. In juvenile or dried specimens the skin is somewhat dull giving a grayish appearance, particularly to tail where the hairs are sparse. Tail with hairs entirely white on ventral surface, with a few dusky hairs mixed with white on dorsal surface. The tail of one specimen has a white pencil at tip. The dorsal region is much duller than in either *ungava* or *mackenzii*, and with face paler ochraceous-tawny. The skull of *soperi* has cranium more slender and more arched, with rostrum longer, narrower and less depressed than in either *ungava* or *mackenzii*; interorbital constriction narrower than in *ungava* and broader than in *mackenzii*; braincase slightly smaller and audital bullae smaller and more rounded than in *ungava*.

*Measurements*.—*Type*: Total length, 135 mm.; tail vertebrae, 33; hind foot, 17. Skull: Condylbasilar length, 22; nasals, 6.5; interorbital breadth, 3; zygomatic breadth, 14; lambdoidal width, 9.1; incisive foramina, 4.2; maxillary tooth-row, 6; height of skull, 9. Average of three females from Emma Lake, Saskatchewan: Total

length, 134.5 (142-121); tail vertebrae, 31.3 (33-30); hind foot, 17. Skulls: Condylbasilar length, 21.3 (22-20.5); nasals, 6.3 (6.5-6.2); interorbital breadth, 3; zygomatic breadth, 13 (13.7-12.2); lambdoidal width, 9.2 (10-8.7); incisive foramina, 4 (4.2-3.8); maxillary tooth-row, 6; height of skull, 8.9 (9.8-8).

*Geographic distribution*.—From southwestern Manitoba and south-central Saskatchewan, west to south-central Alberta; in forested areas on edge of northern Great Plains region.

Regarding the ecological conditions where the type specimen was trapped, Mr. Soper writes: "The terrain here is gently rolling with a forest cover of aspen poplar, white spruce and Banksian pine—a typical Canadian Zone environment. The specimen was taken about halfway up the east slope of the Swanson Creek valley, which here is only about 20-30 feet deep. At this particular point the soil is sandy loam with Banksian pine predominating, the forest cover, on the whole, being heavy and the ground densely shaded. About 50 yards west of the spot where the specimen was trapped beside a decayed, moss-covered log, the boggy floor of the Swanson Creek valley begins, thickly grown to black spruce, willows and alders. In some places this lowland is very hummocky and covered with sphagnum moss and Labrador tea."

*Remarks*.—The body colouration of the type specimen of *soperi* is almost identical with specimens of *Phenacomys intermedius levis* Howell from Waterton Lakes National Park and Coleman, Alberta, but the *intermedius* group have no yellowish on nose and face and the rostrum of the skull is much less depressed than in the *ungava* group. Eight adult skins of *P. u. ungava* Merriam from northern Ontario (Algoma, Cochrane, Kenora, Nipissing and Sudbury districts) are considerably darker on back than *soperi*, bright chestnut brown, approaching *Prout Brown* or *Cinnamon Brown* of Ridgway, with face definitely yellowish, approaching *Tawny-Brown*. Four specimens from western Alberta (Bearberry Creek, west of Olds) and two from northeastern Manitoba (Churchill), referred to *mackenzii* are lighter brownish than *ungava*, but not as pale as *soperi*. Adult skulls from northern Ontario (*P. u. ungava*) have crania flatter and less arched, audital bullae larger and more elongated. One skull from Churchill and four from western Alberta (*P. u. mackenzii*) have small rounded bullae similar to *soperi*. Two skulls from Favourable Lake, Kenora district, Ontario, approach *mackenzii* in having small rounded bullae as well as in their small size, but the colour of the skins is

as dark as in *ungava*, to which form they approach in the greater number of characters.

*Specimens examined*.—Eight, from the following localities: *Alberta*: Battle Lake, head of Battle River (J. D. Soper collection), 2. *Manitoba*: Riding Mountain National Park, 1. *Saskatchewan*: Emma Lake, southeast of Prince Albert National Park (F. A. Banfield collection and Royal Ontario Museum of Zoology), 5.

Thanks are due to Mr. F. A. Banfield, Toronto; Dr. W. E. Saunders, London, Ont.; J. Dewey Soper, Winnipeg; and the Royal Ontario Museum of Zoology, Toronto, for loan of specimens and other valued assistance.

Examination of material recently obtained by field parties of the National Museum of Canada seems to call for description of a new form in the *Phenacomys intermedius* group from the north-west coastal region of British Columbia:

***Phenacomys intermedius laingi*, new subspecies**  
Northwest Coast *Phenacomys*.

*Type specimen*.—From Kimsquit River, Cornice Creek, near head of Dean Inlet, latitude about 52° 54' north, longitude about 127° west, altitude 2500 feet. Female adult, No. 16528. Catalogue of Mammals, National Museum of Canada; collected by Hamilton M. Laing, June 22, 1939; original number 1736; nursing.

*Diagnosis*.—Colour noticeably gray in comparison with other forms of *Phenacomys*; light silvery gray with only a very faint suggestion of brownish wash; sides slightly paler gray, and under parts plumbeous with hairs dark at bases and with tips whitish; tail dark gray above, whitish below, with white pencil at tip in type specimen; feet dull whitish. Compared with specimens of *P. i. intermedius* from different areas east of the Coast Range (N. M. C. No.'s 118, *type*, Kamloops; 7901, Hope-Princeton summit; and 12161, Wistaria, near Burns Lake), the skull is noticeably longer, proportionately more slender and with sides more nearly parallel; heavier and with cranium more angular, interorbital constriction longer and more deeply furrowed, and with rostrum longer. The Kimsquit and Stuie specimens (*laingi*) have about the same skull size and proportions as the five adult skulls of *Phenacomys intermedius oramontis* Rhoads (1895)\*, virtually topotypes, in the National Museum collection, taken in 1927 by Charles H. Young and H. M. Laing between 4500 and 4800 feet in Lihumpton (or Lihumitson) Park in extreme southwestern British Columbia, about 121° 55' west, a few miles north of the 49th parallel, east of Cultus Lake, and about 18 miles north of Mount Baker, Washington. However,

*oramontis* has both upper and lower molar tooth-rows much wider and heavier, with trefoil of lower anterior molar larger and more expanded, lambdoidal ridges more prominent, and interorbital narrower and more deeply furrowed. In the above respects *laingi* is intermediate between *intermedius* and *oramontis*. In *oramontis* the audital bullae are larger and flatter than in the two other forms mentioned.

*Measurements*.—*Type* (female): Total length, 155; tail vertebrae, 40; hind foot, 24. Skull: Condylbasilar length, 24; nasals, 7.6; interorbital breadth, 4.2; zygomatic breadth, 15; lambdoidal width, 10; incisive foramina, 5; maxillary tooth-row, 6.6; height of skull, 7.6. Male (No. 15919, N. M. C., collected near Stuie, B.C., by Charles J. Guignet, August 12, 1938). Total length, 151; tail vertebrae, 40; hind foot, 20. Skull: Condylbasilar length, 24; nasals, 7.8; interorbital breadth, 4; zygomatic breadth, 15; lambdoidal width, 10; incisive foramina, 4.8; maxillary tooth-row, 6.7; height of skull, 7.8. Three juvenile males (taken in Rainbow Mountains, August 22-27) average: total length, 110.3; tail vertebrae, 27; hind foot, 18.6.

*Geographic Distribution*.—Coast Range of British Columbia at heads of Dean Inlet (Kimsquit River), and Bella Coola Inlet (Hotnarko River and Rainbow Mountains, near southern boundary of Tweedsmuir Provincial Park).

*Specimens examined*.—Seven, from the following localities: *British Columbia*: Caribou Mountain, 4700 feet, near Stuie, at junction of Hotnarko and Whitewater rivers, 1; Kimsquit River, Cornice Creek, 2500 feet, 1; Mount Brilliant, Rainbow Mountains, 5000 to 5500 feet, near southern boundary of Tweedsmuir Provincial Park, 5.

*Remarks*.—Dr. J. A. Allen (1899) described specimens from Telegraph Creek, British Columbia, on the east side of the Coast Range, and about 400 miles farther north than the Bella Coola region, under the name *Phenacomys constablei*, which was placed in synonymy of the interior form, *P. i. intermedius* Merriam, by Howell (1926). The writer examined some of these specimens several years ago, and their darker colour and smaller measurements, as well as different habitat from the coastal belt, seem to put them apart from *laingi*.

It is noteworthy, but perhaps not of conclu-

\* Racey and Cowan (1935, H25) refer specimens from Alta Lake, about 60 miles NNE of Vancouver, to *P. i. olympicus* Elliott (1899, 225) but since *Phenacomys* from the Pacific side of the southwestern Coast Range of British Columbia are undoubtedly the same, and *P. i. oramontis* Rhoads (1895) has priority over *P. i. olympicus* Elliot (1899), the latter should be regarded as a synonym of *P. i. oramontis*.

sive significance in view of the generally restricted and extremely local habitat of most forms of *Phenacomys*, that intensive field collecting of small mammals for the National Museum of Canada in the region of Powell River, Stillwater, Gordon Pasha Lake, Bute Inlet, Loughborough Inlet and Kingcome Inlet in 1926, and in the Rivers Inlet region (including some of the coastal islands) in 1937, failed to show any evidence of the presence of *Phenacomys*, and only one specimen was taken near the head of Bella Coola Inlet in 1938, one additional adult near the head of Dean Inlet, and five juveniles (August 22nd to September 24th) in the Rainbow Mountains in 1939. *Phenacomys i. intermedius* has been taken at various points east of the Cascade and Coast Ranges from near the International Boundary north to Telegraph Creek, as well as other parts in the interior of British Columbia west of the Rocky Mountains. Five specimens of *Phenacomys ungava mackenzii* were taken in the Peace River District of British Columbia east of the Rocky Mountains in 1938 and recorded by Cowan (1939).

The following Canadian forms of *Phenacomys* are recognized:

- Phenacomys intermedius intermedius* Merriam. Near Kamloops, B.C.
- Phenacomys intermedius laingi* Anderson. Kimsquit River, B.C.
- Phenacomys intermedius levis* A. B. Howell. St. Mary's Lake, Mont.
- Phenacomys intermedius oramontis* Rhoads. Mt. Baker Range, B.C.
- Phenacomys ungava ungava* Merriam. Chimo, Ungava, P. Q.
- Phenacomys ungava crassus* (Bangs). Rigolet, Hamilton Inlet, Labr.
- Phenacomys ungava mackenzii* Preble. Fort Smith, N. W. T.
- Phenacomys ungava soperi* Anderson. Riding Mountain, Manitoba.

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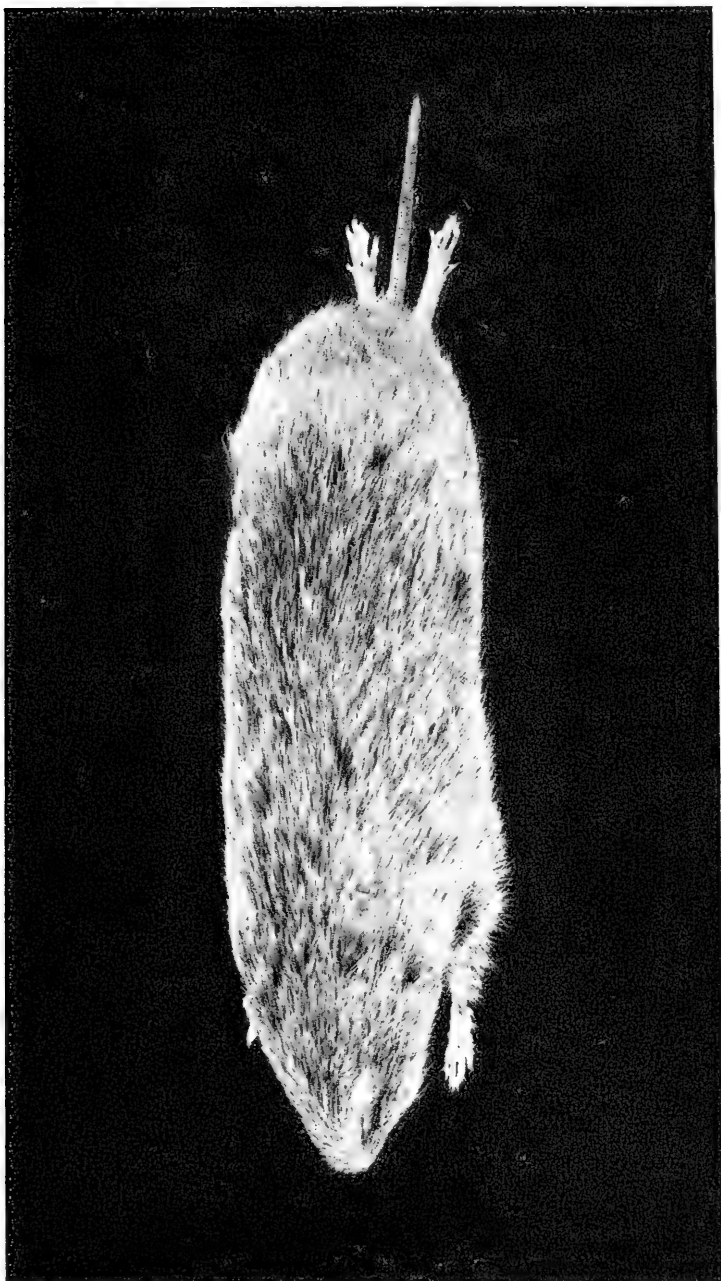
## NOTES ON THE FAUNA OF BRUCE PENINSULA, MANITOULIN AND ADJACENT ISLANDS

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**A** GLANCE at the map makes it clear that the Georgian Bay and North Channel are separated from Lake Huron by the Saugeen or Bruce Peninsula, a series of small islands and reefs, the Manitoulin Island, Cockburn, Drummond and St. Joseph Islands. Of these the "Grand Manitoulin" island is famed, among other things, for being the largest freshwater island in the world.

This peninsula-island arc is a northward extension of the sinuous Niagara Escarpment. This escarpment, the most prominent physiographic feature of the Lake Ontario region, starts near Syracuse, New York, forms the Genesee Falls at Rochester and the world-famed Niagara Falls, the "Mountain" of the Niagara fruit belt, and a picturesque eastward-facing line of cliffs stretching mile after mile to the Blue Mountains of Colling-



*Phenacomys ungava soperi* Anderson  
Prairie Phenacomys

National Museum of Canada, Mammals, No. 17131. Original number 4358, J. Dewey Soper collection, Swanson Creek, middle of section 34, Township 19, Range 17, Riding Mountain National Park, Manitoba. Altitude about 1100 ft. June 5th, 1941.

Photographed by W. H. Hutton (about natural size)





Courtesy National Parks Bureau

*Limestone formation, Flowerpot Island, Georgian Bay Islands National Park*



Courtesy National Parks Bureau

*Maple grove, Beausoleil Island, Georgian Bay Islands National Park*



wood, and west and north into the peninsula and islands under discussion. The main cliff-making formation is the Niagara limestone, a marine and highly fossiliferous dolomitic sedimentary formation of middle Silurian age. Beneath it outcrop locally lower Silurian sandstones and Ordovician limestones, forming lesser, but here and there important, eastward- to northward-facing escarpments. All the formations dip gently westerly or south-westerly away from the escarpment face.

The dominant calcareous character of the escarpment-forming rocks has resulted in sweet, fertile soil over much of the region, carrying the flora and even the climate of the Transition life-zone far to the north. The contrast between the forest growth and fauna of the island chain and that of the Precambrian mainland to the north, is that between the typical Transition and Canadian zones. Some small islands such as Partridge and Haywood, have geological boundaries passing through them, the life-zones being as distinct as the limestone and quartzite of the island foundations. Cloche Island, north of Little Current, is mostly composed of nearly flat-lying lower Ordovician limestone, but a prominent hill of Precambrian quartzite rises through it to a height of some two hundred feet. Leaving the pleasant summer air and willows and maples of the flat land, one climbs the quartzite amid spruce groves, white birch and poplar, surrounded by tormenting mosquitoes and blackflies. A gyrfalcon even darts at one to enhance the atmosphere of the north. In this remarkable manner does geology control the life-zones; the calcareous islands being in the Transition Zone, the granite mainland in the Canadian Zone.

The writer has made a long and detailed study of these regions, primarily from a geological standpoint. (See *Geological Survey of Canada Memoir* 111, 1919 and *Paper* 37-25, 1937). Nature notes were also kept, however, resulting in the record of hundreds of daily observations. Shores, lakes, dense woods, all were explored at one time or another.

A start was made in 1912, when the writer spent most of the summer on the eastern end of Manitoulin Island. Trips were made also to Gore Bay and Fitzwilliam Island, and in early October a preliminary trip was made up the Bruce Peninsula.

In 1913, from September 9 to October 17, the writer explored the peninsula from the interior, and this investigation was continued in 1914 from August 5 to August 26. On June 9, 1915, the writer assembled his party on a launch in Wiarton Har-

bour, whence he worked north studying the eastern and northern shores of Bruce Peninsula, the small islands to the north including Fitzwilliam Island, then South Baymouth and the eastern and northern shores of Manitoulin Island, Cockburn and St. Joseph Islands, finishing the season at Sault Ste. Marie on the 26th of October. In 1916, the first week of July was spent in making a trip from Kagawong to Gore Bay, Meldrum Bay and across to Greene Island on the south shore. In 1920, camp was established on Lake Manitou, and the eastern end of Manitoulin was studied from June 7 to July 17, with a trip or two farther west. The summer of 1935 from June 15 to September 10 was spent in an intensive survey of the whole island, aided as in 1920 by an automobile. A three-day trip was also made to Cockburn Island, and a day's trip to the Duck Islands.

From the seven note-books thus assembled, summaries have been prepared. As the days of Indian control have given place to white settlement, changes have become marked, and it is hoped that these notes may provide a basis for comparison with present conditions. The peninsula-island chain forms a natural migration route, and it seems possible that post-glacial adjustment of flora and fauna may show itself along it.

The notes relating to Cockburn and St. Joseph Islands are based upon all too brief studies. Drummond Island, being United States territory, was not investigated.

The peninsula and islands form step-like topography with steep escarpments facing east or north-east and gentle slopes extending toward Lake Huron. The maximum elevation recorded on Manitoulin Island is 1,020 feet (440 feet above Lake Huron). Much of the region still remains wooded, glacial stripping having removed the soil over large areas, leaving rocky surfaces unsuitable for agriculture. Many of the benches however, especially those underlain by the Ordovician formations, provides excellent soil and are extensively cultivated. The north-eastern part of Manitoulin Island and St. Joseph Island are noted for their excellent farms.

Numerous small lakes occur on Bruce Peninsula, and a series of beautiful deep lakes on Manitoulin Island. All told a great variety of land and water habitat exists.

The forest growth is dominantly hardwood,—beech, maple, elm, birch, etc., with cedar in the swamps and pine and some spruce on the ridges. Beech is scarce or absent on Manitoulin, but plentiful on Cockburn Island.

For convenience, "Bruce Peninsula" is taken to

include Colpoy Bay, with Wiarton Harbour at its head, and all country north to Cabot Head, Tobermory, and the adjacent small islands. Fitzwilliam Island, which is nine miles long, is recorded separately. On Manitoulin Island, South Baymouth (the harbour at the entrance to South Bay), Tamarack Cove at the eastern end of the island, and Burns Harbour on Vidal Bay were

important camp sites in 1915, and are commonly used as limiting stations in the summaries which follow.

Birds seem to love the vicinity of Indian habitation, and the reserves at Cape Croker on Bruce Peninsula, and Wekwemikong on Manitoulin Island, have many records to their credit.

(To be continued.)

## BOOK REVIEWS

AMERICAN PLANT NAMES; *compiled by Willard N. Clute; third edition, Willard N. Clute Co., Indianapolis, Indiana, 1940, pp. 1-285.*

Professional and amateur botanists alike will welcome this new and much enlarged and improved edition of *American Plant Names*. The use of the book, however, is made needlessly difficult by the apparent lack of systematical arrangement or sequence of the families; also the compiler is not to be commended for the arbitrary elimination of a number of families including the entire grass family. No fern or fern-allies, nor any of the lower cryptogams are included. The volume has several "finding indices", including an index to the families and genera as well as an index to common names. In the second part of the book "compound names" are indexed according to the first noun in the name.—A.E.P.

OUTLINE OF THE FUNGI; *by G. W. Martin; University of Iowa: Studies in Natural History, Vol. XVIII, Supplement; pp. 1-64, 1941.*

The author presents keys to all the major groups of fungi including the Myxomycetes and Lichens. A key may be considered primarily as a tool to aid in the identification of unknown specimens, and as such may be based upon superficial and unrelated characters. It may also serve a more fundamental purpose by providing a means of expression for a system of classification. The science of taxonomy aims to classify all organisms phylogenetically, and a key which attempts to express this system of classification should be based upon those characters which are considered to be of fundamental importance in indicating relationships.

The keys presented in this paper are designed with the latter aim in mind and, as the author states, are intended to serve only as a taxonomic framework. The major groups are broken down into families and the names of representative genera of each are given. In general a conservative view of family limitations is taken. There are eight plates with one hundred and eighteen line drawings of representative species of all

groups, all but four of these being original drawings. A glossary of the technical terms is included.

The author regards the fungi as an independent phylum, distinct from both plants and animals, and being derived phylogenetically from the Protozoa, a theory which is unlikely to find acceptance with the majority of mycologists at the present time.—J.W.G.

PLANT GALLS AND GALL MAKERS; *by Ephraim Porter Felt; Comstock Publishing Company, Ithaca, N.Y., 1940; 364 pp., illustrated, price \$4.00.*

Here is a book that deserves to be brought to the attention of naturalists, and indeed to all people looking for an out-door hobby. Moreover, it demonstrates that the study of plant galls is not only a fascinating one, but also offers a rich field for new discoveries of fact.

The principal insect gall-producers belong to three groups, namely the gall-wasps, gall-midges, and plant-lice with their relatives. The main plant groups susceptible to galls are the willows, the oaks, and the Compositae. A great variety of form is manifested in plant-galls, and so characteristic that most insect species may be identified by the gall they produce.

It is only fitting that this book should have been written by Dr. Felt; indeed no other man could do the whole field justice. The bulk of the original research work behind it was performed by him and published in an impressive collection of scientific papers and bulletins. It required only the addition of such recent work as that of Kinsey and of Weld to achieve a complete synthesis of knowledge in this field.

The present volume is written in the form of a key profusely illustrated with line drawings and photographs. A general introduction covers the biology and host relationships of the insect groups concerned. The result is one of those rare books that are of value not only to the professional biologist but also to the amateur field-naturalist.—A.W.A.B.

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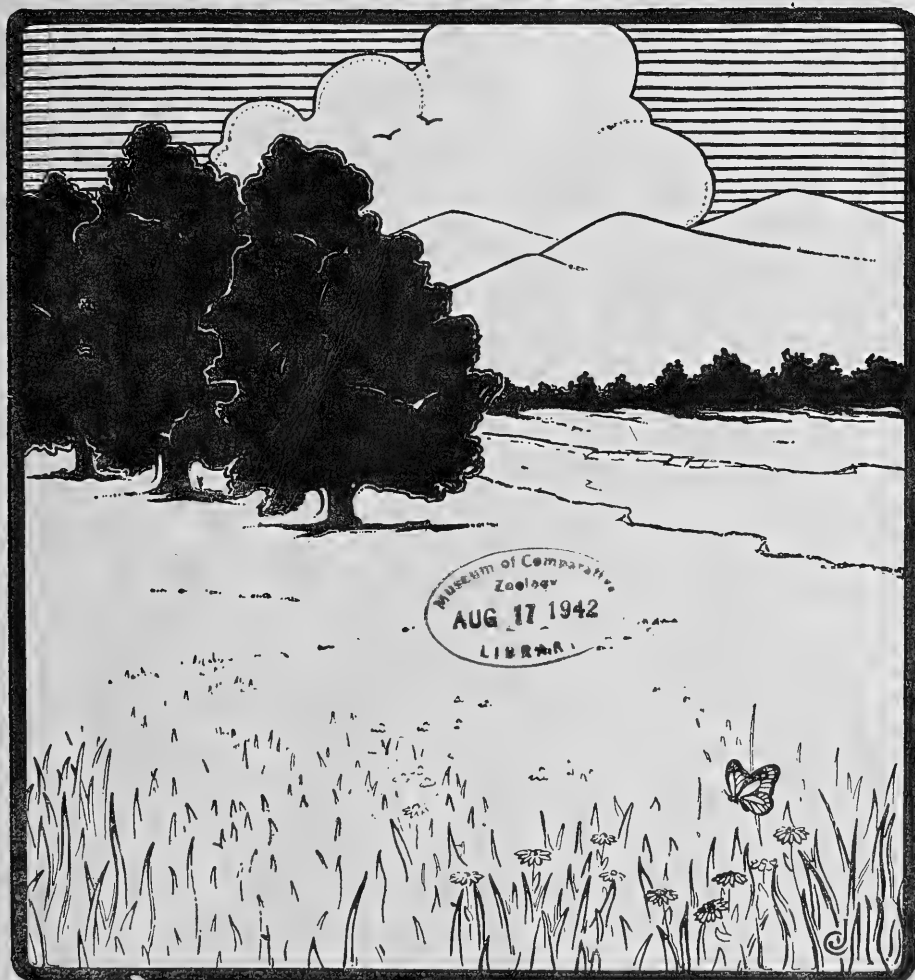
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## CONTENTS

	PAGE
Editorial.....	63
Mass Movement of the Wasp, <i>polistes fuscatus</i> var. <i>pallipes</i> Le P. By Geoffrey Beall.....	64
Observations on the Migratory Behaviour of Leeches. By L. R. Richardson.....	67
Notes on the Fauna of Bruce Peninsula, Manitoulin and Adjacent Islands (continued). By M. Y. Williams.....	70
Andrew Downs, 1811-1892. An Appreciation. By Virginia Tufts.....	81
Book Reviews:	
Voles, Mice and Lemmings. By J.R.D.....	82
Trees of the Eastern United States and Canada. By A.W.A.B.....	82

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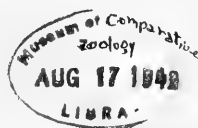
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## EDITORIAL



During the last quarter-century, biological taxonomy has advanced in many groups almost to the stage where the whole field has been completely covered by the Linnaean system. Even in Canada the frontier has been pushed back in many cases to this stage. As a result, systematics is entering the realm of finer distinctions, which require the light of other methods of approach to assess their true value. These methods of approach, which have rapidly risen in importance during the period, include genetics, ecology, palaeontology and developmental physiology.

In face of this problem, biologists are fortunate in having recently been given a comprehensive guide to this new phase of taxonomy. It is *The New Systematics*\*, a collection of twenty-one essays each by authorities in their respective fields, and edited by Julian Huxley. Although this volume has now been available for nearly two years, it is considered that notice of it would be of value to a considerable number of Canadian naturalists, in view of a general unfamiliarity with it, and of the difficulty of obtaining copies at the present time. We are very grateful to the publishers for sending a copy of their photographically reprinted issue, for, as they say, their problem now is not to distribute books but to produce them.

It would be an extremely difficult matter to attempt to review the opening chapters either individually or as a whole. However, the task has been made easy by a remarkable introductory chapter by Julian Huxley, in which he has comprehended and summarised the views of his colleagues.

It will be refreshing to the older biologists to read that although there is no single criterion of a species, failure to interbreed or to produce

fertile offspring is still considered the nearest approach to it. Morphological differences, and ecological, geographical, or genetical distinctness must also be taken into account. Moreover, increasing study of the species problem has served only to show that species have a greater reality in nature than any other taxonomic category. The fundamental problem of systematics has been postulated to be that of detecting evolution at work, and how "continuity of groups is introduced into the biological continuum." Following along this line, modern research has made great progress in the study of the formation of species, or speciation. This may be considered to depend first on selection, secondly on isolation, and thirdly on intrinsic factors.

Selection is still considered the prime factor in evolution, marking the recovery from recent anti-selectionist tendencies. Studies of selection at work have brought out its varying value according to the population density, degree of isolation, and the ecological characteristics of the environment.

Isolation is another potent factor in evolution. Recent statistical analysis has shown that isolation actually promotes differentiation, "a fact which could not have been prophesied on any *a priori* grounds." Geographical isolation is still considered the most important component, and has been found to be the more effective the smaller the area and the longer it has been isolated. However, it is now clear that ecological, physiological, and genetic isolation can be equally effective.

The third main factor in evolution is intrinsic in the organism. In this field, the greatest contribution in recent years has been made by the geneticist. The study of mutations and of polyploidy, and of the results of hybridisation or species-crosses, has given the cytologist a rare insight into the possible origins of species. Here

\* *The New Systematics*; edited for the Association of the Study of Systematics in relation to General Biology; Oxford University Press, 1940 (reprinted photographically, 1941); 583 pp.

the greater part of the tale has yet to be told, and a vast field remains to be laid open by genetical analysis. It is noteworthy and encouraging that chromosome study has in nearly all cases confirmed the species-conceptions and classification of the pure systematist.

Perhaps the greatest nightmare of Canadian field-naturalists, and mammalogists in particular, has been the problem of subspecies. On this question, *The New Systematics* has much to offer. It agrees that sub-species may legitimately be called species in the making, although it points out that a considerable proportion of them remain as sub-species or become extinct. Naturally geographical sub-species have hitherto received most attention, but it must be remembered that there are also physiological sub-species, mainly among parasitic and phytophagous insects; and ecological varieties, adapted to different habitats, and best known among higher plants.

There are two rather distinct kinds of geographical sub-species. There are those which are completely isolated, as in terrestrial forms on islands or aquatic forms in lakes. And then there

are groups replacing each other geographically over continental areas, where the population centre of each sub-species is correlated with the type of country and intergradations are found between these centres. Such groups have been given the term *Rassenkreis* ("race-circle") by Rensch; it is considered, however, better to designate them as polytypic species. How sub-species can manage to maintain their individuality in an area of free intermixing is possibly explained by the formation of balanced gene-complexes within the population centres.

What of the future for systematics? The key to further progress, implied in almost all the contributed chapters and specifically expressed by the entomologist Thorpe, lies in linked studies, where the general biology, ecology, physiology and genetics of the group may be correlated with its morphological characters. The immediate practical recommendation is the establishment of field stations by the larger museums, and closer contact between the museum man, the field man, and the experimental biologist.

## MASS MOVEMENT OF THE WASP, *POLISTES FUSCATUS* VAR. *PALLIPES* Le P.\*

By GEOFFREY BEALL

*Dominion Entomological Laboratory, Chatham, Ontario*

**D**URING the autumns of 1935 to 1938, the writer observed, at two points on the western part of the north shore of Lake Erie, many and sometimes countless numbers of the wasp, *Polistes fuscatus* var. *pallipes* Le P., flying in some one direction, as if an entire vast population were pressing steadily on to an objective. Two observations of notable mass flights will be described briefly as examples of the phenomenon under discussion. One such flight was observed in the early afternoon of September 25, 1937, at the tip (7 miles south of the main line of the north shore of Lake Erie) of Point Pelee where a stream of countless *P. fuscatus* flew south along the spit at from 1 to 6 ft. from the ground. Further back, they streamed by the watch-tower of a lifesaving station (at that time ½ mile from the tip of Pt. Pelee) at a height of about 25 ft. over the top of low surrounding trees. According to the keeper, a far greater flight of wasps had beaten like hail against the upper windows of the station on the previous day. Another great flight was observed on September

24, 1938, near the hamlet of Cedar Springs, 12 miles from Chatham, Ontario. This station of observation was at an undistinguished part of the north shore of Lake Erie about 35 miles below Pt. Pelee. A stream of wasps was observed from 11:00 a.m. to 6:00 p.m. sweeping across a field at from 1 to 20 ft. The countless wasps looked, as they were viewed from one side of the route against dark trees, like willow-down blowing before a fierce wind, except that this down blew one way, into the wind, while the heads of the plants inclined in the opposite direction.

In the course of our discussion the movement of the wasps will be likened to the autumnal migrations of the monarch butterfly, *Danaus archippus* Fab., as discussed by Beall (1941, 1 & 2), but in one respect, i.e., that the wasps appeared to fly over a narrow route and apparently not elsewhere, they differed fundamentally from the butterfly, which migrated over the country generally. This tendency to a restricted flight was noticed

\* Contribution No. 2112, Division of Entomology. Science Service, Department of Agriculture, Ottawa, Canada.



particularly at Cedar Springs, where on September 24, 1938, both when the wasps swept along the shore and when they left the lake to sweep inland across a field, they followed a narrow route outside which there occurred no vigorous or unanimous flight, although many of their species were quietly working blossom in the vicinity of that route.

2. THE PLACE AND TIME OF FLIGHT

All the marked flights of *P. fuscatus* seen by the writer are reported in Table I. Measurements of meteorological conditions, when given, refer to conditions at a height of 5 ft. from the ground; the wind velocity is expressed in miles per hour. The limitation of records to Pt. Pelee and Cedar Springs should not be given much importance, because these were practically the only places on the lakeshore that were visited excepting Pt. aux Pins, a few miles below Cedar Springs, where no flights were observed. Six of the eight records were made in September, but according to the residents of Pt. Pelee the greatest flights of wasps generally occur there in middle October.

The only continuous observations on the flight of *P. fuscatus* were made during the period from September 15 to October 2, 1938 (excepting September 29), at Cedar Springs. During this period, great flights of *P. fuscatus* were seen on September 23, 24 and 27. In addition, on September 15, 1938, numbers of these wasps appeared to be drifting southwest along the bank with a north-west wind. From the accounts of residents of Pt. Pelee it appears probable that flights occur there, towards the end of September, with quite as great a frequency as the 4 days out of 17 noted at Cedar Springs.

The writer's casual observation for many years has been that *P. fuscatus* is to be found much more frequently during late September working the blossom of goldenrod or of wild aster within (say) 600 ft. of Lake Erie than at any point remote from the lake; certainly such was the case during the entire period of continuous observation at Cedar Springs during 1938, even when there was no great flight in progress. On the other hand, the nests of *P. fuscatus* cannot be particularly numerous by the lake, for the writer has never noticed them there. Accordingly, the wasps must fly to the lake, although being small, swift insects the diffused movement involved has not been detected casually and can probably not be studied easily even by detailed counting, so that for any study of the movements of *Polistes* the concentration of wasps beside Lake Erie probably provides the only favourable conditions.

TABLE I. A SUMMARY OF OBSERVATIONS MADE BETWEEN 1935 AND 1938 ON MARKED FLIGHTS OF *Polistes fuscatus* var. *pallipes* Le. P.

Date	Hour	Place	Numbers of Wasps	Direction of Flight	Wind Direction	Wind Velocity	Sun	Temperature
Sept. 13, 1935	3:00-4:00 p.m.	Pt. Pelee	Hundreds	S	NE	Low	Covered	71°F.
Oct. 22, 1935	----	Pt. Pelee	Hundreds	SW	NW	Low	Clear	High*
Oct. 15, 1936	Afternoon	Pt. Pelee	Countless	S	—	—	Clear	High**
Sept. 13, 1937	3:00 p.m.	Pt. Pelee	Some	S & N	N	7 m. p.h.	Covered	63°F.
Sept. 25, 1937	1:00-3:30 p.m.	Pt. Pelee	Countless	S	S	3 m. p.h.	Clear	75°F.
Sept. 23, 1938	11:30 a.m.— 3:00 p.m.	Cedar Springs	Countless	SW	SW	Moderate	Clear	Medium
Sept. 24, 1938	11:00 a.m.— 6:00 p.m.	Cedar Springs	Countless	SW and NW	N	High	Dull	Medium
Sept. 27, 1938	3:30 p.m.— 4: p.m.	Cedar Springs	Countless	SW and NW	N	Moderate	Clear	High

\* Observation made by Mr. W. A. Grubb, Pt. Pelee, Ontario.  
\*\* Observation made by Dr. C. C. Bell, Chatham, Ontario.

### 3. THE RELATIONSHIP BETWEEN WIND AND FLIGHT

As can be seen in Table I, only 2 flights were recorded with a southerly wind, i.e., the great flight, described in Section 1, to the south at Pt. Pelee of September 25, 1937, and the flight at Cedar Springs of September 23, 1938. On these days, a continuous stream of *P. fuscatus* flew with great unanimity and fury into the wind.

The preceding paragraph, describing the reaction of the wasps to a southerly wind, might easily apply also to one of the autumnal migrations of the monarch butterfly, *Danaus archippus* Fab., as reported by Beall (1941, 1); with a northerly wind the observations were again similar to those on the monarch, for the wasps have most frequently been observed flying into the wind, although sometimes their drift with the wind has exceeded the progress made against the wind. Thus in the flight of September 13, 1937, at the tip of Pt. Pelee, the writer observed *P. fuscatus* drifting south down the spit with their head into the north wind, and in most cases they ultimately flew back up the Point into the wind. The return movement was frequently interrupted by alighting on the lee side of bushes near the tip, where, incidentally, they could be very easily picked off the bushes, as has been reported for monarchs under similar circumstances by Beall (1941, 1).

### 4. THE FLIGHT OVER LAKE ERIE

Great flights of wasps, rather surprisingly, pass some distance out over Lake Erie, for the keeper of the Southey Shoals Lighthouse reported that frequently during the autumn, wasps, apparently *P. fuscatus*, go past or alight in great numbers on the lighthouse which is 7 miles off Pt. Pelee. There has been further reported the occurrence of a great flight of wasps, apparently *P. fuscatus*, past a sand dredger, anchored 2 miles off Pt. Pelee on September 28, 1938, when many of the crew were stung by wasps. *P. fuscatus* has been observed frequently by the writer to pass out over the lake, although it did so generally with a certain hesitancy. Such hesitancy was noticed particularly on September 25, 1937, at Pt. Pelee, when a light south wind, which would seem to favour movement down the spit, was blowing. A great many of the wasps, on coming to open water at the extreme tip, rose from a height of about 6 ft. and about half of them drifted inland at an increasing height; the others went out over the water.

If *P. fuscatus* flies far out over Lake Erie, it may be expected that sometimes many will be drowned, and so observations were made for any sign of their having met such a fate. Although in a watch

kept for the last two weeks of September in 1938, when *P. fuscatus* was migrating, only 3 were noted cast up at Cedar Springs, yet a great many were found dead on the beach at Pt. Pelee on October 3. They were particularly numerous at the extreme tip, but could be found all along the beach, for some distance back, at the rate of perhaps one every yard. Practically all were close to the water although not actually within reach of the waves, so that it was impossible to tell whether they had died near the water or had been cast up dead from the lake.

### 5. THE DESTINATION AND SIGNIFICANCE OF THE FLIGHTS

Generally, as described in Sections 4 and 5, the movement of *P. fuscatus* resembled in many ways the autumnal migration of the monarch butterfly, *Danaus archippus*. There seems never to have been any suggestion in the literature, however, that the wasp also engages in migration on a continental scale. On the other hand, Rau (1930) has reported that several species of *Polistes* move from one region of nesting to another of hibernation, so we may suppose the great mass flights observed were the form taken by such a movement on the part of *P. fuscatus*. The place of hibernation is unknown, and although it is probably somewhat more distant than might have been anticipated (in the case of wasps that reached the Southey Shoals Lighthouse, 7 miles from Pt. Pelee, the least flight from land to land must have been 14 miles, whereas Rau reported only flights of a mile or so) it almost certainly is not so remote as the wintering places of the monarch, for some hibernation probably occurs in the region where the flights were seen. The evidence of such hibernation is the report that the wasps winter in the Lifesaving Station at Pt. Pelee, where the writer has frequently (records were only made on September 15 and October 21, 1935, and on October 2, 1937) seen *P. fuscatus* clustered in the corners by the hundred. There is, of course, a possibility that these clusters were only temporary and formed prior to the final hibernation; such behaviour is discussed by Rau (1931).

The movement of the wasps may not even be a definite flight from one region of nesting to another of hibernation but rather a haphazard quest for a region of hibernation, for although there appeared, as from Table 1, to be a preponderance of southerly flight, it is probable that more extensive observations will show that the direction of the flight varies from one day to another. In support of such a possibility, the staff of the Pt. Pelee Lifesaving Station asserted

strongly that on some days wasps stream in countless numbers to the south and on other days they move in numbers, apparently as great, to the north. They reported, in particular, that such alterations of flight occurred during the last week of September, 1938.

#### 6. SUMMARY

Flights of the wasp, *Polistes fuscatus* var. *palipes* Le P., in countless numbers, have been observed on 8 occasions on the western part of the north shore of Lake Erie. The movements of the wasp resembled greatly the autumnal migration of the monarch butterfly, *Danaus archippus* Fab., in that (1) the wasps were seen in abundance and in movement near Lake Erie, (2) they seemed to be moving southward and to fly most readily into the wind and (3) they apparently flew out over Lake Erie for at least 14 miles. They differed from the monarch in flying in much closer formation. Apparently, the flight of *P. fuscatus* was a movement from a region of nesting to one of hibernation, but it was not clear where the latter lay, although it was probably many miles from the former. It appears possible that the wasps do not go directly

from one point to another, but drift about in great swarms.

#### 7. ACKNOWLEDGEMENTS

The successive coxwains, Mr. W. A. Grubb and Mr. E. J. Balkwell, of the Pt. Pelee Lifesaving Station were most helpful in giving information on wasps. In a similar way the writer is indebted to Mr. William Moore, keeper of the Southey Shoals Lighthouse. Mr. G. S. Walley, Division of Entomology, Ottawa, kindly determined the material.

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## OBSERVATIONS ON THE MIGRATORY BEHAVIOUR OF LEECHES

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MASS MOVEMENTS and migrations of animal populations have been the subject of much enquiry, and form a source of information of great value in the interpretation of the ecology and biology of various species and their communities. Such phenomena have been described for many invertebrates, particularly certain insects, where the movement of populations is frequently a matter of economic importance. In the Annelida, the habit is generally considered as restricted to the marine polychaetous worms, where swarming is a phenomenon correlated with reproduction and noteworthy for the remarkable periodicity achieved by some of the species (the "Palolo" worm, etc.). I have, however, been unable to find reference to migrations or mass

movements in either the *Oligochaeta* or the *Hirudinea*. The following observations are therefore presented, since migration appears to be a frequent habit in at least the one species of *Hirudinea* which has brought itself to my attention.

Studies of the biology and ecology of leeches are a difficult task. The great majority of the freshwater species are secretive in habit, remaining apparently inactive and in concealment throughout the greater part of the day. From examination of the stomach contents of speckled trout (*Salvelinus fontinalis* Mitchell), it has become evident that such species of leeches as *Herpobdella punctata* and *Nephelopsis obscura* are most active during the early morning and the late evening, since they are common in the

#### ERRATA

In the article by Geoffrey Beall entitled "The monarch butterfly, *Danaus archippus* Fab. II. The movement in Southern Ontario", December, 1941:

p. 133, nineteenth line from top, 25.9 should read 23.1

p. 133, seventh line from top, right-hand column, 25.9 should read 23.1

p. 133, twentieth line, .65 should read .58

p. 134, bottom bracket, right-hand side, Table I, 107.1 should read 106.1

p. 135, third line from the bottom, left-hand column, .65 should read .58

stomachs of trout taken at these times. On the other hand, such species as the very weakly pigmented *Dina fervida* appear to be fully nocturnal, spending the day in concealment, but equally as active at night as the predacious *Macrobdella decora* is during the day. *Haemopsis marmoratis* is generally a scavenger and carries on a moderate activity throughout the day. A few specimens of this species may be seen moving over the bottom of a stream or feeding on the body of a dead animal, but investigation of the locality will generally reveal that the great majority of the *marmoratis* population is in concealment under stones, logs or debris. On three occasions I have observed behaviour of this species markedly differing from the usual, and apparently referable only to a migration or mass-movement involving a population of this species.

This was observed first early in June, 1934, at the Coulombe River, a tributary of the St. Francis River in south-eastern Quebec. The Coulombe River is a small stream with long stretches of quiet water running at slow speed over a bottom of fine gravel. Short runs of fast water separate the quiet stretches. This river runs through a small lake, Coulombe Lake, shortly before entering the St. Francis River. The lake itself is shallow and richly supplied with aquatic vegetation. On the first visit to this water, *Glossiphonia complanata*, *G. stagnalis*, *Placobdella phalera*, *Macrobdella decora*, *Herpobdella punctata*, *Nephelopsis obscura* and *Haemopsis marmoratis* were recorded at various points around the shore of the lake. No leeches were found in the river. Five days later, a second visit was made to the river at a point above the lake, and at this time large numbers of *H. marmoratis* were seen more or less uniformly scattered over the gravel in the quieter waters. In the fast water, this species was abundant underneath the stones and small boulders. Eight *Haemopsis* were found on the carcass of a small fish, *Eupomotis gibbosus*. The fish was returned to the water, and by evening all the flesh had been removed from the skeleton. Searching upstream in shallow water with a clean bottom, I counted more than one hundred and fifty *Haemopsis* in a pool only thirty feet long and averaging twelve feet in width. These leeches were all actively crawling upstream and not seeking shelter, even though there was ample protection present. They were quite insensible to disturbance.

Two days later, these *Haemopsis* had again disappeared from the brook and only a few scattered specimens in concealment could be found. Throughout this period, *H. marmoratis* was the only species observed to behave in this fashion.

Several days later a study was made of the

Stoke River. This stream is also a tributary of the St. Francis. It is a small stream averaging only ten to fifteen feet in width, and similar in nature to the Coulombe River. Aquatic vegetation is heavy along the margins of the quiet waters but the center of the brook is generally clean. On the occasion of the first visit, very careful examination of the brook yielded only a few *Haemopsis*, which were nearly all in concealment. Two days later hundreds of leeches were observed at the same point. They were dispersed uniformly over the bottom, all crawling actively upstream and showing no tendency to concealment even when disturbed.

At the time it was estimated that there were between five and ten *Haemopsis* on each square yard of clean bottom. These numbers were maintained over a distance of a quarter of a mile of stream. Above this main band, several small groups were observed, the individuals behaving in the same fashion.

Fortunately in this case it was possible to continue observations on the leeches for several days. At the end of the second day the main body had slightly diminished in size and was then about a mile above the point where it had first been observed. Below the main group, the conditions were similar to those at the time of the first visit, the *Haemopsis* being few in number and nearly all in concealment, although an occasional specimen could still be found heading upstream. On the third day, the number of leeches in the main group was obviously declining; and by the end of the fifth day no trace of the group as a whole could be found, and only an occasional leech was seen in the open.

In both of the above cases the stream was carefully examined above and below the main body of the leeches, to determine whether upstream there was the body of an animal, or some other object which would form an attraction for the leeches, or whether downstream conditions were unfavourable or unsuitable to the leeches and so had caused them to migrate. No evidence for either could be found, and after the band had passed through a section of the brook the number and behaviour of the leeches remaining appeared normal. The possibility that this was a migration or swarming connected with mating was considered, but no evidence favoring this could be found. It was noticed that all the leeches were of comparatively uniform size and full-grown, but no one locality was found with an abnormally higher number of cocoons, nor did I observe a single pair in copulation. Some cocoon deposition had taken place prior to the migration, generally along the course of the brook. Apart from this there

was no sign that mating had taken place.

The following spring a third instance of this migration came to my attention when I had a small brook under observation at the west end of the Island of Montreal. This is a highland brook exposed for the greater part of its course and draining through open fields; it opens out into small ponds at three points. *H. marmoratis* is a common species in the ponds during the summer months. The numbers are small and all are generally in concealment. During the last week in May, at the time when the surface drainage from the surrounding fields was decreasing large numbers of *Haemopsis* appeared in the brook. The phenomenon observed at the Stoke and the Coulombe Rivers was repeated on a smaller scale. The leeches moved actively upstream with complete disregard to concealment or disturbances. So far as I was able to determine, the migration lasted only for two days, but at the end of this time I was able to collect large numbers of *Haemopsis* from the marshy ground at the side of the stream and in nearby non-permanent pools. These locations appeared to have been the terminal point of the migration.

The above observations made at three locations and on three separate occasions are strongly indicative of a tendency to migration in *Haemopsis marmoratis*. Consideration of mass population movements in animals has shown that whereas many factors may be involved, in any one case it is frequently possible to distinguish one factor as a primary causal agent. Seasonal movements associated with reproduction are generally of a 'to-and-fro' nature, the ripe adults leaving the area suited to the requirements of the adult, and migrating to an area which satisfies the apparently rigidly defined conditions necessary for the protection of the egg and the growth of the young. Following spawning, the adults return to their own habitats. Seasonal movements of a less directional nature arise commonly as a consequence of the movement of the organisms that serve as food. These may be moved either passively, as in the case of water-borne organisms, or as the result of seasonal changes in climate; or actively, where they exhibit independent migration. An example of the latter is frequently seen in northern lakes, where in the spring Ephemeroptera nymphs migrate to the estuaries of streams and pupate. These are followed by the speckled trout and other fishes which feed on the pupae in large numbers at this period. A third factor commonly productive of mass-movements is that of an over-burdened food-supply. The frequently cited examples of lemming and locust migrations fall into this category. Migrations resulting from

this cause are distinct from the preceding types.

Migrations with a background of reproduction are characteristically bi-directional for the adult and are followed by uni-directional migration at a slower pace for the young. This the most commonly observed form of migration in fish. On the other hand, movement of a population following a food-supply is commonly slow, directional only insofar as the movement of the food supply is directional, and can be generally associated with some physical or climatic factor influencing the food-supply. On the other hand, migration induced by an over-burdened food-supply spreads from a common focus (which is usually the area most favourable to reproduction) uniformly in all directions, provided that the physical and biological conditions are uniform about that focus. The latter being seldom the case, a directional tendency appears which concerns only a portion of the population, the remainder perishing under unfavourable conditions. The failure of the migrants to establish themselves along the path of the migration, and their ability to return only by an infiltration which is at a slower pace than the original movement, appear to be characteristic of this form of migration.

The migrations of *Haemopsis* which I observed cannot be clearly assigned to any one of the above types. No bidirectional migration was observed, and at the end of the migration the distribution of leeches in the stream appeared the same as before. There was no indication that these leeches were moving upstream to a spawning place and later returned. Recently deposited egg-capsules were observed before, during and after the migration at the Stoke River and in the last case. At no time did I locate a concentration of cocoons at any one spot either in the streams or in the near-by marshes or pools. Finally the leeches, wherever observed, were always moving in the one direction, namely upstream. This fact, along with the observation that there was no significant diminution in the food-supply, and that the final distribution of the leeches in the streams following their migration was uniform, would indicate that this behaviour of the leeches could not be attributed to changes in the food-supply.

It would appear that the activities of the *Haemopsis* population, here observed on three distinct occasions, are to be considered on the basis of the present evidence as being a migration of a distinct type. There is the possibility on the other hand that this behaviour was actually a wave of activity which passed up the stream progressively affecting the leech population; in which case, the stimulus must have been brought up-

stream by the leeches themselves. However, in view of the fact that quite clearly there was a migration from the ponds to the brooks and finally onto the marshy border of the brook in the case observed on the Island of Montreal, I believe that for the present it is preferable to consider the behaviour of *Haemopsis* in the three recorded cases as being examples of true migration.

A habit akin to swarming has been observed by the writer for *Glossiphonia complanata*. This is a common species in southern Quebec. During the summer and fall, specimens are frequently found under stones and debris in shallow water below the Lachine Rapids near Montreal. The species is generally dispersed, except in the spring when large numbers congregate in small areas apparently for the purpose of mating. This usually takes place late in May, when as many as twenty *G. complanata* can be found attached to the lower surface of a single stone often less than a foot in diameter, the majority carrying eggs or brooding young. In immediately adjoining areas the species will be absent.

While the present observations do not serve to establish the basis for the behaviour observed in *Haemopsis*, the evidence that leeches exhibit mass movements is of interest in connection with problems of distribution. Tacit assumption, on all too little evidence, is given to the belief that

the distribution of leeches is the result of the intervention of other animals, and that the leech is passively transferred from one water-body to another. While this is readily acceptable in the case of such forms as *Piscicola punctata* and *Placobdella parasitica* which remain attached to their hosts for long periods of time, other forms are generally more transitory parasites and will readily release their hold on a host when it is removed from the water, or quite frequently even when the host is shaken in the water. Moreover the habit of brooding, which is generally developed in the rhynchobdellids, fairly effectively bars the transportation of the eggs of these leeches by other animals, although in some cases (e.g. *G. complanata*) the young, after leaving the parent, are frequently parasitic on fishes and amphibia. Furthermore, among the gnathobdellid leeches and their allies, cocoon deposition is the common habit; since they are attached to plants, stones, etc., there is hardly any opportunity for the passive transportation of the eggs of these species.

It is possible that the active migrations recorded here for *Haemopsis marmoratis* may be paralleled in other species. Demonstrations of this kind would be of the greatest value in establishing the mechanism which has produced the present wide distribution of the freshwater leeches.

## NOTES ON THE FAUNA OF BRUCE PENINSULA, MANITOULIN AND ADJACENT ISLANDS

By M. Y. WILLIAMS

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(Continued from page 62)

### BIRDS

#### COMMON LOON. *Gavia immer*.

Bruce Peninsula. Common on bays and lakes. 1912, October 3, common at Cabot Head. 1913, September 20-October 13, about 24 recorded in various parts, not including a remarkable "flock" of about 60 Loons and gulls, but mostly Loons, seen on Lake Huron on October 9, off Pine Tree Harbour; two adults and two immature birds were seen near Tobermory in September. 1914, August 6-25, six noted in northern peninsula. 1915, June 17-July 9, sixteen noted in northern peninsula, a female (N.M.C.)\* taken at Hope Bay; July 9 and 10, a dozen noted at Cove and Devil islands.

Fitzwilliam Island. 1915, July 14, four.

Manitoulin Island. 1912, common. 1915, July 16-October 12, twenty-nine noted. 1916, July

5, three at Green Island. 1920, June 14-July 4, a dozen noted on Lake Manitou and Manitowaning Bay (doubtless the same birds were seen on different days). 1935, June 22-September 4, sixteen noted in various places.

St. Joseph Island. 1915, October 21, one seen.

#### HORNED GREBE. *Colymbus auritus*.

Bruce Peninsula. 1912, October 3, common at Wingfield Basin. 1913, October 6, two at Stokes Bay; October 7, one at Miller Lake. 1915, July 13, one (sp. ?) on James Island.

Manitoulin Island. 1912, September 17 and 18, common at West Bay. 1915, September 11-30, scarce at Kagawong, Gore Bay and Helen Bay; October 2-16, common in Bayfield Sound and occasionally west to Meldrum Bay.

Cockburn Island. 1915, October 20, one.

\* The notation N. M. C. indicates that the specimen is in the collection of the National Museum of Canada.

St. Joseph Island. 1915, October 25, one.

PIED-BILLED GREBE. *Podilymbus podiceps*.

Bruce Peninsula. 1913, September 27, common on Charles Lake.

Manitoulin Island, 1920, June 15, heard at Lake Manitou; July 5, one at Bass Lake.

DOUBLE-CRESTED CORMORANT. *Phalacrocorax auritus*.

Bruce Peninsula. 1912, October 4, one seen at Cabot Head.

Manitoulin Island. 1935, a mounted specimen in home of Mr. J. Merrylees, taxidermist, Gore Bay, taken in net at Bayfield Sound.

GREAT BLUE HERON. *Ardea herodias*.

Bruce Peninsula. 1913, September 11-October 13, eight seen between North Keppel and Tobermory. 1914, August 7-25, ten seen from Brinkman's corners to Stokes Bay, Pike Bay, etc., 1915, June 23, one at Cabot Head; July 8, four on Bear Rump Island; July 10, four on Devil Island, reported nesting; July 12, four on Yeo Island.

Fitzwilliam Island. 1915, July 13 and 15, two each day.

Manitoulin Island. 1912, June and July, common on Manitowaning Bay; September 19, common at West Bay. 1915, September 4-10, two seen at Honora Bay and Kagawong; October 2-6, two seen at Bayfield Sound. 1920, June 5-30, 16 to 20 seen in vicinity of Little Current and Lake Manitou; July 10-11, three on Lake Manitou. 1935, June 26-29, eight seen near Little Current; July 5-30, 31 seen in various parts of Manitoulin Island, 18 of which were seen on Strawberry Island on the 24th; August 22, 23, 24, several at Lake Wolsey; September 3, several at Francis Point.

BLACK-CROWNED NIGHT HERON. *Nycticorax nycticorax*.

Manitoulin Island. 1915, July 20, one at Tamarack Cove, species uncertain.

AMERICAN BITTERN. *Botaurus lentiginosus*.

Bruce Peninsula. 1913, September 27, two at North Keppel.

Manitoulin Island. 1912, Rare summer resident. 1915, August 19, one at Honora Bay; September 11, one at Kagawong. 1935, June 26, one at West Bay; July 13, one dead at Cape Smith; July 30, two at Smith Bay; September 3, two at Francis Point.

CANADA GOOSE. *Branta canadensis*.

Cockburn Island. 1915, October 25, 19 at Marksville.

BLUE GOOSE. *Chen caerulescens*.

1935, a mounted specimen in J. Merrylees'

(taxidermist) shop at Gore Bay, said to have been shot by him on Gore Bay.

BLACK DUCK. *Anas rubripes*.

Bruce Peninsula. 1913, September 10-October 17, about 75 seen on various shore and inland lake waters; one taken at Lake George. 1914, August 10, several at Miller Lake; August 11 and 12, a dozen or so at Stokes Bay; August 21, common on Pike Bay; August 25, twenty at Oliphant. 1916, September 26, a flock at Wiarton.

Manitoulin Island. 1915, July 27 and 28, eight at Manitowaning; August 9, three at Manitowaning; August 17 and 18, seven at Little Current; September 28, five at Barrie Island; October 12 and 14, five at Burns Harbour. 1920, June 15, one at Lake Manitou; June 30, several at Lake Manitou; July 4, one at Lake Manitou; July 10, one at Providence Bay. 1935, June 26, one at West Bay; July 5, female and 4 young on Garden Island, North Channel; July 6, female and 12 young at West Bay; July 20, two at Manitowaning; July 24, six at Strawberry Island; July 30, common at Smith Bay; July 31, common at South Bay; August, common in suitable places; September 4, ten at Thomas Bay.

COMMON GOLDEN-EYE. *Glaucionetta clangula*.

Bruce Peninsula. 1912, October 3, took one specimen at Cabot Head.

Manitoulin Island. 1912, July 1st et. seq., two broods of 8 to 9 each on Manitowaning Bay. 1935, June 24, two females on Cloche Island.

WHITE-WINGED SCOTER. *Melanitta deglandi*.

Bruce Peninsula. 1913, October 1, 12 at Red Bay; October 6, several at Stokes Bay.

Manitoulin Island. 1915, October 6, several at Cooks Bay (species uncertain); October 11, several at Burns Harbour.

AMERICAN SCOTER. *Oidemia americana*.

Manitoulin Island. 1912, September 10, noted at Michael's Bay.

HOODED MERGANSER. *Lophodytes cucullatus*.

Bruce Peninsula. 1913, September 9, two seen, one taken near Brinkman's Corners.

Fitzwilliam Island. 1915, July 15, two adults, ten young.

Manitoulin Island. 1915, September 17, several (sp. ?) at Barrie Island. 1920, June 19-22, one each day on Lake Manitou. 1935, September 4, two doubtfully identified on Thomas Bay.

COMMON MERGANSER. *Mergus merganser*.

Bruce Peninsula. 1913, September 6-October 9, more than 60 seen on bordering bays. 1914, August 9, twelve at Stokes Bay. 1915, June 30-July 6, several at Cabot Head; July 9, female and 6 young on Cove Island; July 13, several at Yeo Island.

Fitzwilliam Island. 1915, July 14, several.

Manitoulin Island. 1912, July 16, seen at South Bay; July 21-30, increasingly common on all shores of South Bay; October 1, a large flock on Lake Wolsey; Herring Gulls hovered over them, swooped down and robbed them of their fish as they came up to swallow them; October 13, a flock at Burns Harbour. 1920, July 10, six (sp. ?) at Providence Bay. 1935, June 24, a female on Cloche Island; June 28, female and 15 young on Birch Island; July 10, female and 14 young on Manitowaning Bay; July 16, female and several young at Cape Smith; July 25, twenty-five young on Rabbit Island; July 27, 22 at Gore Bay and common (chiefly young) on bordering waters throughout August.

RED-BREASTED MERGANSER. *Mergus serrator*.

Fitzwilliam Island. 1912, September 6, species uncertain.

Manitoulin Island. 1912, June 1, at South Bay. 1920, June 15, one; 16th, two; 20th, female and 12 young on Lake Manitou.

AMERICAN GOSHAWK. *Astur atricapillus*.

Cockburn Island. 1915, October 23 and 25, one (sp. ?) at Marksville.

SHARP-SHINNED HAWK. *Accipiter velox*.

Fitzwilliam Island. 1912, September 6, several; by September 10 appeared to have gone.

Manitoulin Island. 1915, July 22-September 27, eleven noted in ones and twos from Tamarack Cove in the east to Burns Harbour in the west. 1935, August 23, several noted at Dominion Bay; September 3, one at Francis Point; September 4, one at South Bay.

COOPER'S HAWK. *Accipiter cooperi*.

Bruce Peninsula. 1913, September 12, one at Tobermory. 1914, August 21, one at Pike Bay.

Manitoulin Island. 1915, August 27, one; 30th, two; September 4, one at Honora Bay. 1935, July 11, one at Sandfield.

RED-TAILED HAWK. *Buteo borealis*.

Bruce Peninsula. 1913, October 8, one at Miller Lake; October 13, one at Lake George; October 17, one at Sauble Falls. 1914, August 21, one at Pike Bay.

Manitoulin Island. 1912, August 28, one (sp. ?) at Lake Manitou. 1916, July 6, one (sp. ?) at Gore Bay. 1935, June 21, Cloche Peninsula; July 18, 23 dead birds (sp. ?) at Michael's Bay; August 23, one at Dominion Bay.

BROAD-WINGED HAWK. *Buteo platypterus*.

Bruce Peninsula. 1914, August 14, one at Pike Bay.

Manitoulin Island. 1912, September 10, seen at Honora; September 12, with chipmunk at Wekwemikongsing. 1915, August 31 and September 2, seen at Honora Bay; September 14 and 18, seen at Gore Bay. 1920, June 16-July 4, six recorded at Lake Manitou; July 16, one at Honora Bay.

BALD EAGLE. *Haliaeetus leucocephalus*.

Bruce Peninsula. 1913, September 13, one at Tobermory; October 9, one at Pine Tree Harbour; 13th, one at Lake George. 1914, August 7, adult at Lake Emmett; 21st, 2 adults at Pike Bay. 1915, June 21, one at Hope Bay; June 30, one at Cabot Head.

Fitzwilliam Island. July 14, young, 15 adults.

Manitoulin Island. 1912, September 5, three in trees at South Baymouth. 1915, July 19, one at South Baymouth; August 23, adult and immature at Honora; September 25, one at Gore Bay; October 11 and 16, one each day at Burns Harbour. 1935, June 28, one at Birch Island; July 5, two immature on Garden Island; August 10 and 11, one each day at South Baymouth.

MARSH HAWK. *Circus hudsonius*.

Bruce Peninsula. 1913, October 3, male at Pike Bay; October 4 and 5, one at Stokes Bay. 1914, August 11-24, four seen at Miller Lake, Stokes Bay and Pike Bay.

Manitoulin Island. 1912, scarce. 1915, July 22, a grey male at Tamarack Cove; July 30-October 11, twenty-four recorded from South Bay to Burns Harbour. 1916, July 2, four at Kagawong; July 6, two at Gore Bay; 1920, June 13, 15, 22, a male each day at Lake Manitou; July 1, a male; 4th and 10th, 1 female each day, at Lake Manitou. 1935, June 20, a male at Little Current; July 5-30, four males and 5 brown birds in various parts of island; August 10-September 4, one brown bird each day at South Baymouth.

OSPREY. *Pandion haliaeetus*.

Bruce Peninsula. 1913, October 5, one (sp. ?) at Stokes Bay. 1914, August 12, one at Stokes Bay.

Manitoulin Island. 1912, September 18, one at Perch Lake. 1915, July 24 and 25, one each day at Tamarack Cove; August 17, one at Little Current; August 23, one; 30th, two; September 2, two: all at Honora. 1920, June 19, two at nest on Pine Lake. 1935, July 4, one on Cloche Island; 5th, one on Garden Island; 9th, one at Wekwemikong; 12th, one at Cape Smith; 23rd, one at South Bay; 30th, nest and at least one young bird at South Bay; August 14, one at Kagawong; September 3, one at Francis Point



GYRFALCON, *Falco rusticolus*.

1935, June 22, one occupied a "granite" hill on Cloche Peninsula and repeatedly darted at us; back grey, cheeks darker, side feathers of tail coloured and about two thirds length of mid-feathers, breast greyish, size much larger than any Duck Hawk.

PEREGRINE FALCON. *Falco peregrinus*

Bruce Peninsula. 1912, October 3, a specimen (N.M.C.) taken at Cabot Head. 1915, June 16, two nesting in cleft of cliff at Cape Croker; July 10, four at Echo Island, two immature specimens taken (N.M.C.); July 13, one seen on Yeo Island. 1935, July 17, two seen at Cape Smith.

PIGEON HAWK. *Falco columbarius*.

Bruce Peninsula. 1913, September 12, one (sp. ?) at Tobermory.

Manitoulin Island. 1912, August 26, one at Manitowaning. 1915, July 22, one (sp. ?) at Tamarack Cove; August 11, two at Little Current; 20th, several at Honora. 1935, June 24, one (sp. ?) at Shequindah; August 10, two at South Bay.

AMERICAN SPARROW HAWK. *Falco sparverius*.

Bruce Peninsula. 1913, September 9-23, common from Brinkman's Corners to Tobermory, Cape Hurd and Baptiste Harbour. 1914, August 6-18, common Brinkman's Corners and northwards.

Manitoulin Island. 1912, July 12-September 29, common almost everywhere. 1915, July 29-September 24, fairly common from Manitowaning to Gore Bay. 1916, July 6, one at Gore Bay. 1920, July 8, two at Manitowaning; July 19, two, and 25th, one at L. Manitou; July 16, eight at Honora. 1935, July 10, one at Wekwemikong; Aug. 21-31, several at Sandfield and common at Gore Bay; scarce in September.

SPRUCE GROUSE. *Canachites canadensis*.

Manitoulin Island. 1915, September 11, four at Kagawong.

Cockburn Island. 1935, September 7, four.

RUFFED GROUSE. *Bonasa umbellus*.

Bruce Peninsula. 1912, October 3-6, common at Cabot Head. 1913, September 20, several; September 22, five at Cabot Head; September 30, several at Mar; October 1-13, about 25 seen at Red Bay, Pike Bay, Stokes Bay, Miller Lake, Pine Tree Harbour, Brinkman's and Lake George. 1914, August 5-24, forty-five seen from Cape Chin to Berford Lake. 1915, June 12-17, two females and young at Cape Croker; June 18, one at Hope Bay; June 28-July 1, two at Cabot Head.

Manitoulin Island. 1912, June 26, nest and 5 eggs; June 30, young at Manitowaning; September 17, several at West Bay. 1915, July 19-October 18, fifty-two recorded from South Baymouth to Burns Harbour. 1920, June 16, female; 18th,

four young; 20th, female and several young; 29th, one young; July 4, female; 10th, eight young; 11th, several young; 16th, several; 17th, one: all at Lake Manitou. 1935, June 25, seen at Shequindah; July 9, dead bird, 25th, female and young Wekwemikong; August 20, two at Tobacco Lake; August 21, twelve at Silverwater; August 24, dead bird's feathers at Mississagi Strait; August 30, one at Gore Bay.

Cockburn Island. 1915, October 20, one seen.

St. Joseph Island. 1915, October 25, one taken.

SANDHILL CRANE. *Grus canadensis*.

1935, a mounted specimen at the home of Mr. J. Merrylees, taxidermist, Gore Bay, was said by him to have been taken some years before.

VIRGINIA RAIL. *Rallus limicola*.

Bruce Peninsula. 1915, July 5, two seen at Dyer Bay.

AMERICAN COOT. *Fulica americana*.

Bruce Peninsula. 1913, September 17, five, one taken at Charlie Lake.

Manitoulin Island. 1912, late summer, several at Mindemoya.

KILLDEER. *Oxyechus vociferus*.

Bruce Peninsula. 1914, August 8-21, about fifteen observed from Brinkman's Corners to Pike Bay. 1915, June 12-30, common from Cape Croker to Cabot Head.

Manitoulin Island. 1912, common throughout summer about Manitowaning Bay. 1915, July 21-September 9, well distributed from Tamarack Cove to Kagawong; September 19, flocks at Gore Bay; September 30 and October 7, heard at Helen Bay and Cook's Bay. 1916, July 1-8, common at Kagawong, Greene Island and Gore Bay. 1920, June 7-17, common, young on 17th, four young on 24th; July 8, four young, a flock on July 17th, all at Lake Manitou. 1935, June 25-August 12, common in all suitable localities; July 9, at Wekwemikong; July 10, several young at Manitowaning; July 25, several young on Rabbit Island.

Bruce Peninsula. 1913, October 6, one at Stokes Bay; October 9, one at Pine Tree Harbour.

Manitoulin Island. 1912, September 19, seen at West Bay.

BLACK-BELLIED PLOVER. *Squatarola squatarola*.

Bruce Peninsula. 1913, October 6, one taken at Stokes Bay; October 9, one at Pine Tree Harbour.

Manitoulin Island. 1912, September 19, seen at West Bay.

AMERICAN WOODCOCK. *Philohela minor*.

Manitoulin Island. 1935, July 17, one seen at Lily Lake. Species also reported by J. Merrylees, taxidermist of Gore Bay.

WILSON'S SNIPE. *Capella delicata*.

Bruce Peninsula. 1913, September 29, one at North Keppel; October 5, two; and 6th, one, at Stokes Bay. 1914, August 8, took a specimen near Brinkman's Corners (N.M.C.); August 12, one seen at Stokes Bay.

SPOTTED SANDPIPER. *Actitis macularia*.

Bruce Peninsula. 1914, August 10-13, ten seen at Miller Lake and Stokes Bay; 21st, common at Pike Bay. 1915, June 9-July 1, common from Colpo Bay to Cabot Head; July 8, heard on Cove Island; July 13, four seen on Yeo Island.

Fitzwilliam Island. 1915, July 15, four seen.

Manitoulin Island. 1912, June 10, nest at South Bay. 1915, July 20-22, four at Manitouwaning; August 14, one at Little Current. 1920, June 7, nesting at Lake Manitou; June 11-July 17, common at Lake Manitou; June 26, four young. 1935, June 23, nest with 3 eggs on Cloche Peninsula; notes to August 24 show even distribution in suitable places over the island.

SOLITARY SANDPIPER. *Tringa solitaria*.

Bruce Peninsula. 1914, August 11, two at Miller Lake; 13th, two at Stokes Bay; 21st, one at Pike Bay.

Manitoulin Island. 1915, August 11-17, two to five seen most days at Little Current; September 11, seen at Kagawong. 1920, June 13 and July 19, one seen on each day at Lake Manitou.

GREATER YELLOW-LEGS. *Totanus flavipes*.

Bruce Peninsula. 1914, August 25, two seen at Oliphant.

LESSER YELLOW-LEGS. *Totanus flavipes*.

Bruce Peninsula. 1914, August 17, one seen at Hope Bay.

HERRING GULL. *Larus argentatus*.

Bruce Peninsula. 1912, October 3, common at Cabot Head. 1913, September 10-October 9, common on coasts. 1914, August 5-25, about 100 noted at Cape Chin and Stokes Bay. 1915, June 9-July 12, common along east and north shore of Peninsula.

Fitzwilliam Island. 1915, July 14 and 15. Common, July 13, on Yeo Island.

Manitoulin Island. 1912, August 28, common on Lake Manitou. 1915, July 16-October 18, common on all waters; young in flight by July 21st; old nest and one dead young on Wall Island; reported nesting freely on Half Moon Island, where fishermen obtain eggs; probably nest on James Island. 1916, July 3-8, common at Kagawong and on Greene Island. 1920, July 7, young gulls at nest on Lake Manitou. 1935, June 15-September 3, common everywhere on

Manitoulin Island; thousands follow fishing boats in North Channel for cleanings; July 24th, nesting on Loon Island.

Cockburn Island. 1915, October 19-20, common.

St. Joseph Island. 1915, October 21-25, fairly common.

RING-BILLED GULL. *Larus delawarensis*.

Manitoulin Island. 1920, June 6, one at Little Current.

COMMON TERN. *Sterna hirundo*.

Bruce Peninsula. 1912, October 3-6, common at Cabot Head. 1914, August 10-21, fairly common at Ira Lake, Stokes Bay and Pike Bay.

Manitoulin Island. 1915, August 22-September 2, several at West Bay; September 14-23, occasional at Gore Bay. 1920, June 6, several at Little Current. 1935, June 23, two at Cloche Peninsula; June 28, seen on Birch Island; July 18, common at South Bay and appeared to be nesting; August 30, several on Great Duck Island.

CASPIAN TERN. *Hydroprogne caspia*.

Manitoulin Island. These large noisy terns were most conspicuous as they darted about. Noted as follows: 1935, July 5, two at Strawberry Island; July 13 (sp. ?) at Cape Smith; July 19, at South Bay; July 30, one at South Bay

BLACK TERN. *Chlidonias nigra*.

Manitoulin Island. 1920, June 6, several at Little Current.

MOURNING DOVE. *Zenaidura macroura*.

Bruce Peninsula. 1914, August 10, seen at Miller Lake; August 19, seen at Stokes Bay.

Manitoulin Island. 1935, July 13, one seen at Wekwemikongsing.

BLACK-BILLED CUCKOO. *Coccyzus erythrophthalmus*.

Bruce Peninsula. 1913, Oct 4, (sp. ?) at Stokes Bay. 1914, Aug. 17, one at Hope Bay. 1915, June 22, one at Hope Bay; July 6, one (sp. ?) at Cabot Head.

Manitoulin Island. 1912, June 22, several on Wekwemikong Indian Reserve. 1915, July 22, one (sp. ?) at Tamarack Cove; 30-31, three at South Bay. 1920, June 12-July 16, reported seven times at Lake Manitou. 1935, June 22 and 30, heard at Little Current; July 6, heard at West Bay; July 10, heard at Wekwemikong.

GREAT HORNED OWL. *Bubo virginianus*.

Bruce Peninsula. 1913, Sept. 13, one seen at Tobermory.

Manitoulin Island. 1915, July 26, two at Tamarack Cove; July 31, two at South Bay; Sept. 5, took a specimen at Honora (N.M.C.). 1935, July

27, one seen at Lake Manitou.

Cockburn Island. 1935, Sept. 7, two seen.

WHIP-POOR-WILL. *Antrastomus vociferus*.

Bruce Peninsula. 1913, Sept. 9, one in song at Cape Hurd. 1914, Aug. 5, heard at Cape Chin; 6th, several at Brinkham's Corners; 7th, several at Lake Emmett. 1915, June 9-July 1, heard eight times from Colpoy Bay to Cabot Head.

Manitoulin Island. 1915, July 19, heard at South Baymouth; July 20-23, heard at Tamarack Cove; Sept. 12, one at Kagawong. 1920, June 14 and 15, July 5 and 9, heard at Lake Manitou. 1935, Aug. 12, a specimen killed by car at Providence Bay.

NIGHTHAWK. *Chordeiles minor*.

Bruce Peninsula. 1914, Aug. 5-21, fairly common from Lion Head to Stokes Bay; none later. 1915, June 9-24, fairly common from Colpoy Bay to Lion Head.

Manitoulin Island. 1915, July 21-23, six at Tamarack Cove; Aug. 11-14, common at Little Current; Aug. 31-Sept 3, common at Honora. 1920, June 14 - July 9, casual at Lake Manitou. 1935, June 16-29, common; July 4, heard on Cloche Island; July 30, common at Lake Manitou; Aug. 26, one at Gore Bay; Sept. 5, one at South Bay; Sept. 7, common at Little Current.

CHIMNEY SWIFT. *Chaetura pelagica*.

Bruce Peninsula, 1914, Aug. 6, one at Brinkman's Corners; Aug. 12, two at Stokes Bay. 1915, June 12-27, about a dozen between Cape Croker and Brinkman's Corners; July 1-6, several at Cabot Head.

Manitoulin Island. 1915, August 22-31, common at Honora. 1920, July 11-16, fairly common at Lake Manitou. 1935, June 15-30, common at Little Current; July 10, common at Wekwemikong; July 20, common at Manitowaning.

RUBY-THROATED HUMMINGBIRD. *Archilochus colubris*.

Bruce Peninsula. 1914, August 22, one at Pike Bay.

Manitoulin Island. 1915, August 1, one at Manitowaning; September 2, one at Honora. 1920, June 27, a female at Lake Manitou. 1935, July 27-31, common at Manitowaning; August 17, one at Gore Bay; August 30, one at Lake Wolsey.

BELTED KINGFISHER. *Megasceryle alcyon*.

Bruce Peninsula. 1913, October 4-6, several at Stokes Bay. 1915, August 24, about 25 seen from Lion's Head northwards. 1915, June 17, one at Hope Bay; 29th, one at Cabot Head.

Manitoulin Island. 1915, July 27-October 17,

one or two seen in all suitable localities from Manitowaning to Meldrum Bay. 1916, July 1, one at Kagawong. 1935, June 26-September 4, eight recorded over island.

YELLOW-SHAFTED FLICKER. *Colaptes auratus*.

Bruce Peninsula. 1913, September 9-30, common from Wiarton to Tobermory. 1914, August 4-26, common all over Peninsula. 1915, June 12-July 6, common Cape Croker to Cabot Head; breeding at Cape Croker, June 14.

Manitoulin Island. 1915, July 22-Oct. 13, common at South Baymouth, Tamarack Cove and westward to Burns Harbor. 1916, July 5, several at Gore Bay. 1920, June 16-July 17, common at Lake Manitou. 1935, June 26-September 4, common over island.

PILEATED WOODPECKER. *Ceophloeus pileatus*.

Manitoulin Island. 1912, September 18, one at Perch Lake; September 21, two at Gore Bay. 1915, July 21, one at Tamarack Cove; August 6, one at Manitowaning; August 13, one at Little Current; 23rd, one at Honora; September 11, one at Kagawong; 22nd and 29th, heard at Gore Bay; October 9th, one at Cook's Dock; 13th, took a specimen at Burns Harbor. 1935, July 4, one on Cloche Island; July 9, two at Wekwemikong; 27th, a female at Lake Manitou; August 20, heard at Gore Bay; August 24, one at Silverwater.

St. Joseph Island. 1915, October 23 and 24, one each day.

RED-HEADED WOODPECKER. *Melanerpes erythrocephalus*.

Bruce Peninsula, 1913, September 24, one at Wiarton. 1914, August 4-26, about 24 on peninsula north of Wiarton. 1915, June 21-July 5, five recorded at Hope Bay, Brinkman's, Dyer Bay.

Manitoulin Island. 1912, August 28, common at Fossil Hill. 1920, July 9, one at Sandfield. 1935, June 16-September 9, not seen.

YELLOW-BELLIED SAPSUCKER. *Sphyrapicus varius*.

Bruce Peninsula. 1914, August 12, one immature bird at Stokes Bay.

Manitoulin Island. 1915, August 13, one at Little Current, September 3, one (sp. ?) at Honora. 1916, July 2, one at Kagawong; July 6, one at Gore Bay. 1920, June 30, a female at Manitowaning. 1935, June 26, one (sp. ?) at Shequindah; July 11, two adults and two young at Mindemoya; July 20, heard at Mindemoya; July 25, a male at Mindemoya; July 26, one at Lake Manitou.

HAIRY WOODPECKER. *Dryobates villosus*.

Bruce Peninsula. 1912, October 3-6, seen at

Cabot Head. 1913, September 13-October 10, five seen between Tobermory and Brinkman's Corners. 1914, August 21, two at Pike Bay. 1915, June 27-July 6, two at Dyer Bay and two at Cabot Head; Cove Island, one on July 9; Devil Island, one on July 10.

Manitoulin Island. 1915, July 29, two at Manitowaning. August 6-October 12, about fifteen seen between Manitowaning and Burns Harbor. 1935, not seen from June 16 to September 9 over whole of Manitoulin Island.

Cockburn Island. 1915, October 20, one.

St. Joseph Island. 1915, October 25, one.

DOWNY WOODPECKER. *Dryobates pubescens*.

Bruce Peninsula. 1912, October 3-6, seen at Cabot Head. 1913, September 16, one at Tobermory. 1914, August 4, one at Lion Head; August 4, one at Lion Head; August 26, two at Wiarton.

Manitoulin Island, 1915, July 19-October 14, seven recorded from South Baymouth around to Burns Harbor; October 20, one at Cockburn Island. 1916, July 1, one at Kagawong. 1920, June 13-July 11, seen 5 times at Lake Manitou; July 17, immature female at Lake Manitou. 1935, July 17 and 18, four seen each day at Manitowaning.

ARCTIC THREE-TOED WOODPECKER. *Picoides arcticus*.

Bruce Peninsula. 1912, October 3, common at Cabot Head.

Manitoulin Island. 1915, September 25, one at Gore Bay.

EASTERN KINGBIRD. *Tyrannus tyrannus*.

Bruce Peninsula. 1913, September 12, seen at Tobermory. 1914, August 4-22, common everywhere. 1915, June 12-August 31, common from Manitowaning to Honora. 1916, July 1-6, common at Kagawong and Gore Bay. 1920, June 4-July 18, common at Lake Manitou. 1935, June 15-September 10, common over whole island.

CRESTED FLYCATCHER. *Myiarchus crinitus*.

Manitoulin Island. 1920, June 18, heard at Lake Manitou. 1935, June 22 and 30, heard at Little Current; July 4, heard at Cloche Island.

EASTERN PHOEBE. *Sayornis phoebe*.

Bruce Peninsula. 1913, September 17, one at Tobermory. 1914, August 4, one at Lion Head; August 22, one at Pike Bay.

Manitoulin Island. 1912, August 28, one at Manitowaning. 1920, June 9-July 10, fairly common at Lake Manitou; nesting on June 17th, young on 30th; a nest on July 3. 1935, July 9-27, in song over eastern part of island.

LEAST FLYCATCHER. *Empidonax minimus*.

Manitoulin Island. 1920, June 14-July 2, fairly common in song at Lake Manitou. 1935, July 10, heard at Wekwemikong.

EASTERN WOOD PEWEE. *Myiochanes virens*.

Bruce Peninsula. 1913, September 13-30, recorded 6 times over northern part of the peninsula; several at Oliphant. 1914, August 11-24, heard at Stokes Bay, Hope Bay, Pike Bay. 1915, June 27, heard at Dyer Bay.

Manitoulin Island. 1915, July 31-September 8, fairly common at South Bay, Little Current and Kagawong. 1920, June 9-July 8, fairly common at Lake Manitou. 1935, June 22-30, heard commonly at Little Current; July 9 and 10, heard at Wekwemikong.

HORNED LARK. *Otocoris alpestris*.

Bruce Peninsula. 1913, October 7-13, seen at Miller Lake, Pine Tree Harbour and Lake George. 1915, June 13, two at Cape Croker; June 25, one at Brinkman's Corners.

Manitoulin Island. 1915, August 13-October 16, seen sparingly at Little Current, Gore Bay and Meldrum Bay, where a specimen showed conspicuous sulphur-yellow on head. 1916, July 1-8, seen at Kagawong and Manitowaning. 1920, June 8-15, sixteen recorded at Lake Manitou. 1935, June 18, several at Little Current; July 23 and 26, one each day at Manitowaning.

TREE SWALLOW. *Iridoprocne bicolor*.

Bruce Peninsula. 1914, August 18-21, several at Spry and Pike Lake. 1915, June 17, one at Cape Croker; 25th, one at Brinkman's; July 9, common on Cove Island; 10th, common Devil Island.

Manitoulin Island. 1915, August 6, common at Manitowaning; August 13-14, flocks at Little Current. 1920, June 14-July 11, common at Lake Manitou; nesting June 30, flocking July 12-17. 1935, June 15-July 30, common at Lake Manitou.

BANK SWALLOW. *Riparia riparia*.

Manitoulin Island. 1935, June 28, one at Little Current.

BARN SWALLOW. *Hirundo erythrogaster*.

Bruce Peninsula. 1914, August 5-26, common at Lion Head. 1915, June 15-July 9, common Cape Croker to Cabot Head, Bear Rump and Cove Islands.

Manitoulin Island. July 27-August 10, common Manitowaning and South Bay. August 11-14, flocks at Little Current; August 18-22, common at Honora. 1935, June 24-July 28, common over eastern end of island; August 22 and 25th, com-

mon at Gore Bay; September 2nd, several at South Bay.

CLIFF SWALLOW. *Petrochelidon albifrons*.

Bruce Peninsula. 1914, August 18, several at Spray.

Manitoulin Island. 1912, August 28, fairly common at Manitowaning; said to be their first appearance. 1920, June 7-July 17, common at Manitowaning and Lake Manitou; July 11, nesting in barn by Lake Manitou. 1935, July 20 and 26, several at Manitowaning.

PURPLE MARTIN. *Progne subis*.

Bruce Peninsula. 1914, August 4, several at Lion Head. 1915, July 29, several at Cabot Head.

Manitoulin Island. 1935, June 16-30, common and in song at Little Current. July 1-30, common at Cloche Island, Manitowaning and Lake Manitou.

CANADA JAY. *Perisoreus canadensis*.

Manitoulin Island. 1912, one seen on Manitowaning Bay (no date).

BLUE JAY. *Cyanocitta cristata*.

Bruce Peninsula. 1913, September 10-October 6, fairly common in cedar swamps from Wiarton north. 1914, August 7-22, seen at Wiarton, Stokes Bay and Lake Emmett. 1915, June 12-July 10, fairly common Cape Croker to Tobermory; July 13, several on Yeo Island.

Manitoulin Island. 1912, September 19, common at West Bay. 1915, August 19-October 14, common in cedar swamps, Honora to Burns Harbor. 1920, June 19-July 16, observed at Lake Manitou and Honora. 1935, August 1st, two at South Bay; 8th heard at South Bay.

Cockburn Island. 1915, heard on October 20. 1935, heard on September 7.

St. Joseph Island. 1915, three recorded October 23-25.

RAVEN. *Corvus corax*.

Bruce Peninsula. 1913, September 11, took a female near Tobermory (N.M.C.).

AMERICAN CROW. *Corvus brachyrhynchos*.

Bruce Peninsula. 1913, September 11-25, evenly distributed from Wiarton to Cabot Head. 1914, August 4-26, common everywhere. 1915, June 9-July 8, common on whole Peninsula; July 9, several on Cove Island. July 10th, with young on Devil Island; July 13, two on Yeo Island.

Fitzwilliam Island. 1915, July 14, several.

Manitoulin Island. 1912, common everywhere; June 7, young flying. 1915, July 19-September 28, common everywhere, scarce in October. 1920, June 5-30 common at Little Current; July 1-17,

common about Lake Manitou; female with young at Lake Manitou on the 9th; took specimen on 16th (N.M.C.). 1935, June 13-September 7, common everywhere; June 24, young out of nest on Cloche Island.

BLACK-CAPPED CHICKADEE. *Penthestes atricapillus*.

Bruce Peninsula. 1913, September 13, one at Tobermory. 1914, August 5-26, distributed from Cape Chin to Wiarton. 1915, July 9, common on Echo Island.

Manitoulin Island. 1915, July 30-October 18, common over whole island; October 19 and 20, common on Cockburn Island. 1920, July 5, one at Lake Manitou. 1935, June 24, heard on Cloche Island. 30th, one at Little Current. July 7, heard at West Bay. 9th at Wekwemikong. August 24, heard at Silverwater. September 5, several in song at South Bay.

WHITE-BREASTED NUTHATCH. *Sitta carolinensis*.

Bruce Peninsula. 1913, September 13, at Tobermory; 27th, at Charlie Lake; 29th, at Purple Valley.

RED-BREASTED NUTHATCH. *Sitta canadensis*.

Bruce Peninsula. 1912, October 3, one at Cabot Head. 1913, September 13, two at Tobermory. 1915, July 10, one dead on Middle Island.

Manitoulin Island. 1915, September 11, one at Kagawong.

BROWN CREEPER. *Certhia familiaris*.

Bruce Peninsula. 1913, September 10, one at Cape Hurd.

HOUSE WREN. *Troglodytes aedon*.

Bruce Peninsula. 1913, September 12, one at Tobermory. 1914, August 4, two at Lion Head. 1915, June 27, in song at Dyer Bay; June 29-30 and July 6th, heard at Cabot Head; July 8, on Bear Rump Island; July 9, on Cove Island; July 10, common on Devil's Island; July 13, on Yeo Island.

Fitzwilliam Island. 1915, noted July 15.

Manitoulin Island. 1915, July 21-September 7th, fairly distributed from Tamarack Cove to Kagawong. 1916, July 2, in song at Kagawong; July 6th, heard at Gore Bay. 1935, June 18-July 18, fairly common at Little Current and Manitowaning.

CATBIRD. *Dumetella carolinensis*.

Bruce Peninsula. 1914, August 11-19, fairly common at Stokes Bay and Hope Bay. 1915, June 12-July 11, fairly common from Cape Croker to Tobermory.

Manitoulin Island. 1915, July 27th-Sept. 3rd, common from Manitowaning to Honora. 1920, June 9-July 14, common at Lake Manitou. 1935, June 27, one in song at Shequiandah.

BROWN THRASHER. *Toxostoma rufum*.

Bruce Peninsula. 1913, Sept. 22, one at Cabot Head. 1914, Aug. 12, one, and 19, two at Stokes Bay. 1915, June 12-15, one nest and three young at Cape Croker; June 29, one, and July 1, one at Cabot Head; 5, one at Dyer Bay.

Manitoulin Island. 1920, June 15-July 9, seven recorded at Lake Manitou. 1935, June 24, one on Cloche Peninsula; 26, one at West Bay; July 9, one at Wekwemikong.

AMERICAN ROBIN. *Turdus migratorius*.

Bruce Peninsula. 1912, Oct. 3-6, common at Cabot Head. 1913, Sept. 5-Oct. 6, common over peninsula. 1914, Aug. 6-26, common over peninsula. 1915, June 10-July 11, common Colpoy Bay to Tobermory.

Manitoulin Island. 1915, July 18-Oct. 15, common over Manitoulin Island; Oct. 16, flocks. 1920, June 5-July 17, common Little Current and Manitowaning. 1935, June 15-Aug. 25, common over island.

HERMIT THRUSH. *Hylocichla guttata*.

Manitoulin Island. 1916, July 1, common at Kagawong. 1920, June 9-July 11, common in song at Lake Manitou; June 19 and 24, nests with four eggs each at Lake Manitou. 1935, June 15-July 27, common in song over island.

WILSON'S THRUSH. *Hylocichla fuscescens*.

Manitoulin Island. 1912, June 27, nest on face of cliff with three eggs, near Manitowaning. 1916, July 1, several in song near Kagawong. 1920, June 8-July 14, common in song at Lake Manitou. 1935, June 25, heard at Shequiandah and 30 at Little Current; July 8-24, common in song over eastern part of island.

RED-BREASTED BLUEBIRD. *Sialia sialis*.

Bruce Peninsula. 1912, October 3, six at Cabot Head. 1913, September 27-October 10, fairly common North Keppel to Brinkman's. 1914, August 7, several at Lake Emmett; August 21, several at Pike Bay. 1915, June 8-July 6, several seen every day from Colpoy Bay to Cabot Head.

Manitoulin Island. 1912, August 28, several at Manitowaning. 1915, July 17-October 9, common South Baymouth to Cook's Bay. 1920, June 9-July 7, common at Lake Manitou. 1935, June 25-27, several in song at Shequiandah and Little Current; July 6, common at West Bay; July 20-August 24, recorded five times between Manitowaning and Silverwater.

St. Joseph Island. 1915, October 23-25, in flocks.

GOLDEN-CROWNED KINGLET. *Regulus satrapa*.

Bruce Peninsula. 1912, October 3, one at Cabot Head.

Cockburn Island. 1935, September 7, several.

AMERICAN PIPIT. *Anthus spinoletta*.

Manitoulin Island. 1913, September 19-October 11, fairly common from Kagawong to Burns Harbor; a specimen (N.M.C.) taken September 25.

CEDAR WAXWING. *Bombycilla cedrorum*.

Bruce Peninsula. 1913, September 10-18, recorded at Tobermory, Baptiste Harbor and Big Bay. 1914, August 4-26, common over whole peninsula. 1915, June 9-July 5, common Colpoy Bay to Cabot Head.

Manitoulin Island. 1915, July 16-October 12, fairly common over whole island. 1916, July 6, several at Gore Bay. 1920, June 7-July 18, common at Lake Manitou, nesting June 14 and July 15. 1935, June 17-July 3, fairly common over island. August 18, several at Gore Bay.

COMMON SHRIKE. *Lanius ludovicianus*.

Manitoulin Island. 1920, June 9-July 17, fairly common at Lake Manitou. 1935, July 19, recorded at Manitowaning; 23 and 24, at Silverwater.

COMMON STARLING. *Sturnus vulgaris*.

Manitoulin Island. Not present in 1920. 1935, June 16-September 4, flocks almost everywhere. Cockburn Island, September 7, none noticed.

RED-EYED VIREO. *Vireo olivacea*.

Manitoulin Island. 1916, July 1, heard at Kagawong. 1920, June 5-July 18, common at Lake Manitou. June 24, a nest with four eggs. 1935, June 24-July 27, heard almost continuously over island.

WARBLING VIREO. *Vireo gilvus*.

Manitoulin Island. 1916, July 1, heard at Kagawong. 1920, June 5-15, heard at Lake Manitou.

BLACK AND WHITE WARBLER. *Mniotilta varia*.

Bruce Peninsula. 1914, August 26, one at Warton. 1915, July 9, heard at Cove Island; July 10, heard at Devil Island.

Manitoulin Island. 1912, June 27, nesting on rock escarpment Lake Manitou. 1915, August 14-July 16, fairly common from Lake Manitou to Honora.

YELLOW WARBLER. *Dendroica aestiva*.

Bruce Peninsula. 1914, August 6, one at Brinkman's. 1915, July 1, seen at Dyer Bay; July 10, several at Devil Island.

Manitoulin Island. 1920, June 10-July 14, common at Lake Manitou, nesting there June 25th. 1935, June 15-July 10, common in song over island; July 18, one at Manitowaning; August 17, heard at Gore Bay.

MAGNOLIA WARBLER. *Dendroica magnolia*.

Bruce Peninsula. Yeo Island, 1915, July 13, one seen.

Manitoulin Island. 1915, July 16-July 30, fairly common on South Bay. 1920, June 22-23, seen at Lake Manitou.

BLACK-THROATED BLUE WARBLER. *Dendroica caerulescens*.

Bear Rump Island. 1915, July 8, one seen.

MYRTLE WARBLER. *Dendroica coronata*.

Manitoulin Island. 1920, June 16, one at Lake Manitou; July 16, one at Honora.

BLACK-THROATED GREEN WARBLER. *Dendroica virens*.

Bruce Peninsula. 1914, August 12, four at Stokes Bay.

Manitoulin Island. 1912, June 25, seen at Manitowaning. 1915, August 22, two at Honora. 1916, July 6, one in song at Gore Bay. 1920, June 25, one nesting at Lake Manitou; July 3, a male seen at Lake Manitou.

Cockburn Island. 1935, September 7, several.

CHESTNUT-SIDED WARBLER. *Dendroica pensylvanica*.

Bear Rump Island. 1915, July 8, one seen.

Manitoulin Island. 1912, June 22-25, several near Manitowaning. 1920, July 2 and 4, seen near Lake Manitou.

OVEN-BIRD. *Seiurus aurocapillus*.

Bruce Peninsula. 1915, July 1, common at Cabot Head; 9th, common on Echo Island.

Manitoulin Island. 1915, August 23-September 21, occasional at Honora and Gore Bay. 1916, July 1, heard at Kagawong. 1920, June 9-July 11, common at Lake Manitou. 1935, June 23-July 20, common over island.

MARYLAND YELLOW-THROAT. *Geothlypis trichas*.

Manitoulin Island. 1920, July 10 and 17, heard at Lake Manitou. 1935, July 5, heard at Strawberry Island.

AMERICAN REDSTART. *Setophaga ruticilla*.

Bruce Peninsula. 1913, September 13, two, one taken at Tobermory (N.M.C.). 1914, August 26, one at Wiarton. 1915, June 18-July 6, fairly common at Hope Bay and Cabot Head.

Fitzwilliam Island. 1915, July 14, two seen.

Manitoulin Island. 1915, July 17-August 29,

seen at South Baymouth and Honora. 1920, June 14-July 17, fairly common at Lake Manitou, and seen at Providence Bay. 1935, August 21, a male recorded at Gore Bay, the only record for the summer.

ENGLISH SPARROW. *Passer domesticus*.

1912. Common in towns and even at Cabot Head on Bruce Peninsula; and on Fitzwilliam Island, (September 6). 1935, Manitoulin Island, common everywhere, flocking in many places.

BOBOLINK. *Dolichonyx oryzivorus*.

Bruce Peninsula. 1914, August 7-21, common in fields. 1915, June 9-27, common and in song from Cape Croker northwards.

Manitoulin Island. 1915, August 13-27, common over island; flocks at Little Current on 13. 1916, July 8, in song at Gore Bay. 1920, June 5-July 4, common and in song at Lake Manitou; fairly common and males conspicuous until 15. 1935, June 16-28, fairly common in song in all suitable places; occasional in song July 8-13; one male on 20; August 7-15, fairly common in autumn plumage.

EASTERN MEADOWLARK. *Sturnella magna*.

Bruce Peninsula. 1913, September 9-27, common over peninsula; October 1-11, fairly common. 1914, August 4-26, fairly common from Wiarton north. 1915, June 14-July 5, well distributed and in song from Cape Croker northwards.

Manitoulin Island. 1912, common all summer. 1915, July 19, several noted at Gore Bay. 1920, June 4-July 17, common at Lake Manitou. 1935, June 15-July 30, common and in song everywhere; fairly common until August 19.

RED-WINGED BLACKBIRD. *Agelaius phoeniceus*.

Bruce Peninsula. 1914, August 21, seen at Pike Bay. 1915, June 2, several in song at Cape Croker. July 3, several at Cabot Head.

Manitoulin Island. 1912, common all summer. 1915, July 30-August 30, fairly common South Baymouth to Honora Bay: flocking at Little Current August 13 and 14. 1920, June 5-July 17, common at Lake Manitou and South Bay. 1935, June 27-July 31, common in suitable localities. August 1, flocking at South Bay.

BALTIMORE ORIOLE. *Icterus galbula*.

Bruce Peninsula. 1914, August 18, one at Spry; 21, one at Pike Bay, 1915, June 17-20, in song at Cape Croker.

Manitoulin Island. 1920, June 15-July 12, fairly common at Lake Manitou and vicinity; nesting on 16 and 18. 1935, June 25-July 6, fairly common

in song, and seen occasionally until July 25 in eastern part of island.

RUSTY BLACKBIRD. *Euphagus carolinus*.

Bruce Peninsula. 1912, October 3, six at Cabot Head. 1913, October 4-10, common. 100 seen at Stokes Bay on 6, and 100 at Miller Lake on 7.

Manitoulin Island. 1915, September 17, several, and 23, a flock at Gore Bay; Oct. 3, a flock at Helen Bay. 1935, July 6, a doubtful observation at West Bay.

CROW BLACKBIRD (GRACKLE). *Quiscalus quiscula*.

Bruce Peninsula. 1913, September 30, several at Mar; October 4, several at Stokes Bay. 1914, August 8-11, several at Brinkman's, Miller Lake and Stokes Bay. 1915, June 12-28, distributed from Cape Croker to Cabot Head.

Manitoulin Island. 1912, common all summer 1915, July 16-August 31, fairly common from South Bay to West Bay. 1920, June 5-July 17, common at eastern end of island. 1935, June 15-August 12, common everywhere.

COWBIRD. *Molothrus ater*.

Bruce Peninsula. 1913, September 29, took one at Purple Valley; 30, several at Mar. 1914, August 21, at Pike Bay. 1915, June 25-July 5, fairly common Lion Head to Dyer Bay.

Manitoulin Island. 1920, June 5-July 17, common over eastern end of island. 1935, June 26, one at Little Current; 27th, several at Shequiandah; July 9, two at Wekwemikong; 11th, several at Manitowaning.

SCARLET TANAGER. *Piranga erythromelas*.

Bruce Peninsula. 1915, June 9, one in song at Colpoy Bay.

Manitoulin Island. 1912, June 25, recorded in song at Manitowaning. 1915, July 20, a female at Tamarack Cove. 1920, June 19, 23, 25, 30 and July 2, recorded at Lake Manitou. 1935, recorded June 22 at Little Current; 28th at Birch Island; July 6, at West Bay, 9th at Wekwemikong, 12th and 27th near Manitowaning.

INDIGO BUNTING. *Passerina cyanea*.

Bruce Peninsula. 1915, June 12, two in song at Cape Croker; 21st, one in song at Hope Bay.

Manitoulin Island. 1912, June 22, one near Wekwemikong. 1920, June 14, 23 and 30, recorded in song near Lake Manitou. 1935, July 10, two in song at Wekwemikong; August 1, one at Lake Manitou.

COMMON PURPLE FINCH. *Carpodacus purpureus*.

Manitoulin Island. 1920, June 13, seen at Lake Manitou; 30th, a male at Lake Manitou. 1935, July 13, one in song at Cape Smith.

AMERICAN GOLDFINCH. *Spinus tristis*.

Bruce Peninsula. 1913, September 9-24, common Tobermory to Wiarton, where they were flocking on the 24th. 1914, August 6-21, common. 1915, June 21-July 6, common.

Manitoulin Island. 1915, August 9-September 30, common Manitowaning to Honora. 1916, July 1, several at Kagawong. 1920, June 9-July 17, fairly common over eastern end of island. 1935, June 22-30, common in song; fairly common to September 6.

EASTERN TOWHEE. *Pipilo erythrophthalmus*.

Bruce Peninsula. 1913, September 13-30, common at Tobermory. 1914, August 4-26, fairly common Wiarton to Brinkman's Corners. 1915, June 9-June 17, in song; July 6, fairly common Colpoy Bay to Cabot Head.

Manitoulin Island. 1915, July 16-September 14, fairly common everywhere. 1920, June 15-25, fairly common in song at Lake Manitou.

SAVANNAH SPARROW. *Passerculus sandwichensis*.

Manitoulin Island. 1920, June 24, two in song at Lake Manitou.

VESPER SPARROW. *Pooecetes gramineus*.

Bruce Peninsula. 1912, October 3-6, seen at Cabot Head. 1913, September 13-27, common Wiarton to Tobermory. 1914, August 6-21, common Brinkman's to Pike Bay. 1915, June 21-24, rare at Hope Bay and Lion's Head; July 3, nest and 3 eggs at Cabot Head.

Manitoulin Island. 1912, August 28, fairly common at Manitowaning. 1915, July 23-September 29, fairly common over farm and park lands of island. 1916, July 1-7, common in song at Kagawong and Gore Bay. 1920, June 11-July 18, commonest sparrow at Lake Manitou. 1935, June 26-July 27, fairly common in song; August 22-24, common Gore Bay and Silverwater.

SLATE-COLORED JUNCO. *Junco hyemalis*.

Bruce Peninsula. 1913, September 31-October 10, common everywhere. 1914, August 6, nest and 4 eggs at Brinkman's Corners; August 17, birds at Hope Bay, and 21 at Pike Bay. 1915, June 30, adult and 3 young at Cabot Head.

Manitoulin Island. 1915, July 22, nest and 4 eggs at Tamarack Cove; July 23-October 20, common Tamarack Cove to Burns Harbor. 1916, July 1, seen at Kagawong. 1920, June 10-July 17, fairly common at Lake Manitou and vicinity.

TREE SPARROW. *Spizella arborea*.

Bruce Peninsula. 1913, September 7, three seen at Tobermory.



CHIPPING SPARROW. *Spizella passerina*.

Bruce Peninsula. 1914, August 4-26, occasional at Lion Head, Hope Bay and Wiarton. 1915, June 8-21, rare in song at Colpoy Bay, Cape Croker and Hope Bay.

Manitoulin Island. 1915, August 2, at Little Current; September 2, seen at Honora; 11th at Kagawong, and 29th at Gore Bay. 1935, June 26-July 14, fairly common over north-eastern part of island.

WHITE-CROWNED SPARROW. *Zonotrichia leucophrys*.

1912, October 3-6, seen at Cabot Head. 1913, September 23-30, fairly common on peninsula.

WHITE-THROATED SPARROW. *Zonotrichia albicollis*.

Bruce Peninsula. 1913, September 13-30, fairly common in all suitable localities. 1914, August 7-10, in song at Lake Emmett and Miller Lake. 1915, June 10-July 6, in song from Colpoy Bay to Cabot Head; July 9 and 10, heard on Cove Island and Devil's Island.

Manitoulin Island. 1915, July 16-October 14,

fairly common over island. 1916, July 4-5, common on Green Island. 1935, June 15-July 24, common in song over island.

Cockburn Island. 1915, October 20, one seen.

SONG SPARROW. *Melospiza melodia*.

Bruce Peninsula. 1913, September 13-29, common Mar to Tobermory. 1914, August 6-26, fairly common from Wiarton north. 1915, June 9-21, common in song Colpoy Bay to Hope Bay; June 29, nest and 3 eggs at Cabot Head; July 2-6, common at Cabot Head and Dyer Bay; July 10, one on Devil Island; July 15, three young on Fitzwilliam Island; July 19-29, in song Tamarack Cove to Manitowaning; August 14-23, seen at Little Current and Honora. 1935, June 16-July 27, common in song in all suitable localities; August 24, common at Silverwater.

Cockburn Island. 1935, September 6, common.

SNOW BUNTING. *Plectrophenax nivalis*.

Cockburn Island. 1915, October 20, one seen.

St. Joseph Island. 1915, October 23, two and a flock of 25 seen.

## ANDREW DOWNS, 1811-1892

### AN APPRECIATION

Few people know that the first of Canada's scientific ornithologists, and the founder of the first Zoological Garden in America, was a resident of Halifax, Nova Scotia. He was Andrew Downs, born in New Jersey in 1811 of Scottish descent. He came to the shores of the North West Arm, Halifax, at the age of fourteen, along with his family. His father was a plumber, and young Andrew was apprenticed to the trade. This, however, held little interest for him, and gradually he gave more and more of his time to the study of animals and birds, and the scientific preservation of wild creatures.

His zoological garden was started at Halifax in 1847, 16 years before the one at Central Park, New York, was opened to the public. Mr. Downs commenced with a piece of land comprising five acres, but soon enlarged his premises to include a hundred acres. The scene of his endeavour was Walton Cottage, Dutch Village Road, North West Arm, Halifax, a lovely sylvan setting of forest, pond, and hill.

The premises of Walton Cottage were laid out with an eye to preserving natural beauty of design, and also provide attraction and accommodation for birds. The house was of Gothic design, and surrounded by flowering shrubs frequented by songsters. The interior was alive with

fitting canaries, all uncaged, and rabbits, porcupines, and other animals rambled about at pleasure.

When Downs moved about feeding his poultry, he was surrounded by dogs, pheasants, pigeons, and rabbits. In a pond not far from the barn were beautiful Chinese swans; a Brazilian Mink and several marmosets chattered in the trees. In a large copse were many deer; but birds, of many kinds, predominated. The atmosphere was completely natural, and perfect harmony met the visitor's eye.

The Prince of Wales paid him a visit in 1860, as did every other notable personage who visited Halifax at that time. In 1864 Downs visited Europe, being complimented by a free passage on one of His Majesty's war vessels. On this occasion he took with him several specimens of provincial wildlife, two cases of mounted birds, and a stuffed moose, which he presented to the London Zoological Garden. While on the Continent he received courtesies from many scientific men of note.

In 1867 he was appointed Superintendent of the Central Park Menagerie, and disposed of his land and animals; but the lure of Nova Scotia was strong in him, and he soon returned. He came back to the North West Arm and purchased a new

property near his old one, and started a new zoological garden. This he continued to improve for about three years, gathering around him birds and animals and continuing his taxidermic work in which he excelled.

Ornithology was his chief study, and the store of knowledge he possessed of birds was very large and accurate, and always freely given to interested enquirers and students. Young people were of especial interest and delight to him, and he was well known throughout the province. He

was distinctly a field naturalist, rather than a student of books.

For his taxidermy he received many awards in London, Paris, and New York. He had a very artistic technique, and his finished specimens appeared very life-like. Mr. Downs was one of the founders of the Nova Scotian Institute of Science, and active in enlarging its membership. Unfortunately he published very little; once he started a book, but it was never completed. He died in Halifax in 1892, wanting but a month of 81 years.

VIRGINIA TUFTS

## BOOK REVIEWS

VOLES, MICE AND LEMMINGS. PROBLEMS IN POPULATION DYNAMICS; by Charles Elton; Oxford University Press, 1942; 496 pp.

The size of this volume may surprise even the zoologist, considering the small size of the animals concerned. However, the author is able to bring forward convincing support for his belief that voles, mice and lemmings are worthy of serious attention. He has compiled records of periodic plagues of mice from ancient times to the present, and from widely scattered lands. Many cases are cited of the destruction of crops, including young forest and fruit trees, and of the role of mice in the spread of disease.

But the economic importance of mice is not entirely due to their destructiveness. Much of the world's trade in furs, Elton points out, is built out of mice and voles and lemmings. Northward, beyond the latitudes where crops will flourish, the mice themselves become a crop harvested by foxes and other fur-bearers, and then in turn by the trappers and the trader.

The book is of special importance to Canada, where so much of our area, nearly 70%, will produce no crop other than wildlife. It is of interest to Canada too because so much of the information it contains is drawn from Canadian sources. Of the four parts into which it is divided, parts three and four are devoted to wildlife cycles in Northern Labrador and in Ungava respectively. The two sources from which most of the history of fluctuation in mice and in the fur-trade in these two areas was traced were the records of the Moravian Missions and of the Hudson's Bay Company.

The central problem emphasized throughout the book is the problem of fluctuations, especially that of periodic fluctuations,—the more or less regular swings between abundance and scarcity which characterize the populations of so many northern animals. Important, too, is an account

of the development of field work, and experiments upon mouse and vole populations, at Oxford during the last two decades under the author's direction. The publication of this book constitutes an important contribution to a phase of ecology in which Elton has pioneered and of which he is the leader.—J. R. D.

TREES OF THE EASTERN UNITED STATES AND CANADA; by William S. Harlow; Whittlesey House Field Guide Series, New York, 1942; 288 pp., price \$2.75.

Professor Harlow has designed this book, it would seem, for the thousands of citizens of eastern American towns and cities who like to get out of doors in their leisure time. It is a field guide to the trees, with notes, as the subtitle indicates, on "their woodcraft and wildlife uses." As such, it is bound in durable leather and has a small page, and can be packed in a haversack but is a little too large to be carried in the pocket.

The book follows the standard pattern of works on this subject, first a botanical introduction, followed by a general key, and then the body of the work details the characteristics of each tree species. Illustrations are plentiful, being reproductions of actual photographs of leaves, twigs, bark and flowers. A feature of the book is a series of coloured photographs revealing unexpected beauty in parts of the tree that are seldom noted by the amateur. In this connection, the author lays special stress on the variety of form, size and colour shown by tree flowers.

This is a nice book to have, for it combines nature lore with the specialist's accuracy and comprehensiveness. Thus it is all the more surprising to note the omission of the balsam fir of the southern Appalachian mountains, *Abies fraseri*, mentioned in Harlow and Harrar's *Textbook of Dendrology*.—A.W.A.B.

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Meetings are held each Monday evening, except on holidays from October to April, in the physics theatre of the University of Manitoba, Winnipeg. Field excursions are held each Saturday afternoon during May, June and September, and on public holidays in July and August.

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Meetings are held at 7.30 p.m. in the Public Library building on the second Monday of each month from October to April. Field trips are held during the spring, and a special excursion in September.

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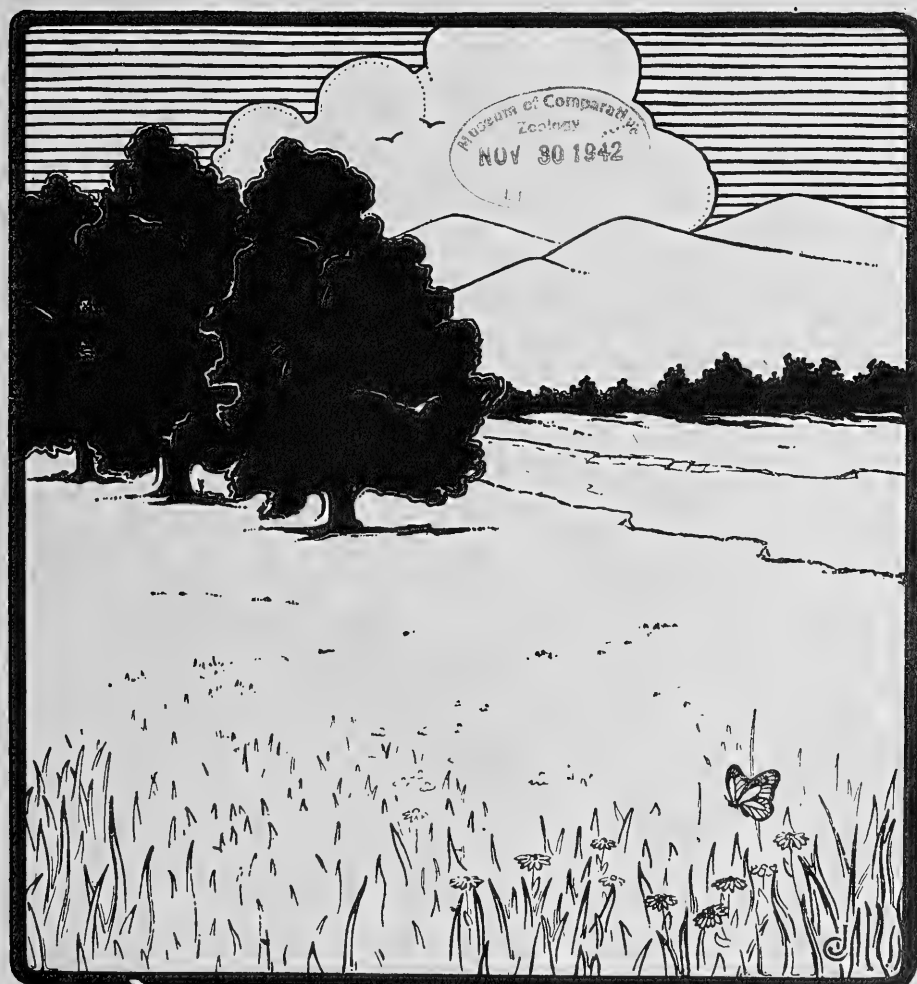
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## CONTENTS

	PAGE
The Long-tailed Chat In Saskatchewan. By J. Dewey Soper.....	83
Canadian Naturalists in Britain.....	85
A Beaver Census in Algonquin Provincial Park, 1939-1940. By Donald L. Robb.....	86
Bats Hibernating in the District of Thunder Bay, Ontario. By A. E. Allin.....	90
Notes on the Fauna of Bruce Peninsula, Manitoulin and Adjacent Islands (concluded). By M. Y. Williams.....	92
Members of the Ottawa Field-Naturalist Club and Subscribers to the Canadian Field-Naturalist, September, 1942.....	94
Book Reviews:	
History, Range and Home Life of the Northern Bison. By C.H.D.C.....	94

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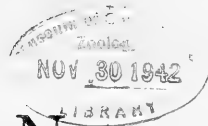
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# The Canadian Field-Naturalist

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No. 6

## THE LONG-TAILED CHAT IN SASKATCHEWAN<sup>1</sup>

By J. DEWEY SOPER

Chief Federal Migratory Bird Officer, Winnipeg

THE LONG-TAILED CHAT (*Icteria virens longicauda*) is a comparatively rare bird in the Prairie Provinces of Canada. In fact, it is highly probable that the observer will never see it unless he visits the Frenchman River Valley of Saskatchewan, or the territory immediately south of Cypress Hills. Theoretically, it should occur in the Alberta portion of the latter district, but apparently there are no records for that province. Therefore, with a single exception to be mentioned later, the Long-tailed Chat is locally confined in this region to the relatively restricted area of Southwestern Saskatchewan, as noted above.

Attention should be drawn to the fact that this territory lies entirely on the Missouri River River watershed. While most of the country belongs to the semiard, (=modified Campestrian) division of the Transition Life Zone, dilute, or more marked, Upper Sonoran Zone conditions clearly exist in the valley of Frenchman River. As a breeder, *longicauda* is not ordinarily to be expected in the West divorced from such an environment; this has very pronounced characteristics, such as shortgrass, treeless plains and desert-like vegetation largely xerophile in character; along the streams localized thickets usually exist which are narrow, dense and thorny.

Mr. P. A. Taverner was the first to record the species in Saskatchewan; Mitchell<sup>2</sup> points out that he collected a male at Cypress Lake on June 4, 1921, and another was observed in the vicinity. The bird was next recorded the following summer by Mr. Lawrence B. Potter at Gower Ranch, Eastend, Saskatchewan; a few were seen here each season from 1924 until 1927 when, in the latter year he wrote a short account of the Eastend occurrences<sup>3</sup>. He also wrote in 1928 to Mr.

Taverner, National Museum, Ottawa, saying that Mr. Steve Mann saw a chat at Piapot; while this is north of Cypress Hills, the environment there is essentially similar to that immediately south of the plateau. In any event, this example is to be regarded as a wanderer from the main range, as I have since done considerable field work in that district without seeing one.

Several years ago Mr. F. G. Bard informed me that in 1929 he collected the first Long-tailed Chats for the Provincial Museum of Saskatchewan. These two specimens (the first a male) were taken at Val Marie on June 10 and 22, respectively. Mr. Taverner writes that Mr. Charles H. Holmes, Dollard, Saskatchewan, took a specimen during July, 1930, "on the Whitemud where it crosses the boundary." In June, 1933, Mr. Potter saw chats twice in the Frenchman River Valley near Eastend. On June 29, 1935, he found a nest of the species containing four eggs, one of which was a cowbird's egg, and in July reported the chats as "plentiful". He published this information the same year.<sup>4</sup> During July, 1937, he further stated in a letter to Mr. Taverner that the birds were "as numerous as ever", and the latter adds that Mr. Potter "found two nests of chats at the head of a coulee 500 feet above the river in association with nesting White-crowned Sparrows; this is a faunal mixture with a vengeance."

In a recent letter, Mr. F. A. Dunk, Director of the Provincial Museum, Regina, informs me that Mr. Norman Clarke, Tregarva, Saskatchewan, stated on June 26, 1939, that a pair of chats was evidently nesting in a coulee on his farm; among other circumstantial evidence was the fact that the birds were actively carrying food, apparently to their young. This is the first reported occurrence

1. Contribution of the National Parks Bureau, Department of Mines and Resources, Ottawa.

2. Mitchell, H. Hedley. "Catalogue of the Birds of Saskatchewan." *Can. Field-Nat.*, XXXVIII, 1924, p. 117.

3. Potter, L. B. "White crowned Sparrow and Yellow-breasted Chat in Southwestern Saskatchewan." *The Auk*, XLIV, 1927, p. 570.

4. Potter, L. B. "Nesting of Yellow-breasted Chat in Saskatchewan." *Connor*, XXXVII, 1935, p. 282.

of the species in Saskatchewan dissociated from the true semiarid sagebrush and greasewood country in the southwestern portion of the province. Tregarva is eight miles north-northwest of Regina on the Hudson Bay drainage, at an elevation of 1,890 feet; conditions are markedly different there than in the real and vital range of the Long-tailed Chat on the Missouri drainage to the southwest, where it is a rather familiar inhabitant and breeder in some Saskatchewan localities ranging in altitude from about 2,500 to 3,400 feet a.s.l. The extraordinary Tregarva record is approximately 160 miles northeast of the nearest point of known, regular occurrence on Frenchman River north of the International Boundary. To date, it is apparent that the species has never been positively recorded on the Missouri Coteau, or in any other southern terrain at lower levels to the east of the Frenchman in either Saskatchewan, or Manitoba. As a breeder this is not apt to occur, but stragglers may eventually be seen in that territory.

Personal field work at intervals in Southwestern Saskatchewan, since 1927, indicates conclusively that these birds are capricious in distribution and only locally common. We may, for example, regard Frenchman River Valley and Cypress Hills as the northern perimeter of its normal range northward into Saskatchewan. However, in numerous localities superficially ideal west and south of this line, it is apparently absent. Even in the Frenchman Valley itself, which offers the most attractive habitats so far known in the province, there are many long stretches where the birds have not been seen.

As Mr. Potter has demonstrated, the species is fairly well represented in this valley and adjacent coulees on the south slope of Cypress Hills west of Eastend and, as previously noted, a few individuals go as far as the source of this river at Cypress Lake. On one occasion and another I have spent much time in the region under review and until the summer of 1941 saw but one or two individuals. It may be of some interest to state that in aggregate I have conducted rather extensive investigations at Cypress Lake (the scene of Mr. Taverner's first provincial record) and westward to Battle, Middle and Lodge Creeks without seeing a single chat. It would therefore appear to be extremely rare or entirely absent in the extreme southwestern corner of Saskatchewan, as well as in adjacent Alberta territory which was also worked. This want is notable, as numerous brushy, semiarid coulees and creek valleys are practically identical with scattered localities a little

farther east where the species is fairly common if not abundant.

It is pointed out by Saunders<sup>5</sup> that the western limits of its common range in Montana are Fergus County and the Musselshell River; this is roughly comparable in longitude to extreme eastern Alberta. He also remarks that the species is evidently rare north of Missouri River, but as now known, it habitually ranges to a point within Canada fully 120 miles north of that line. An interesting note by him in respect to distribution beyond its main nesting range in the Upper Sonoran Zone is that, "West of the centre of the state it occurs erratically, being found for a year or so in certain localities, but not persisting there." A similar circumstance is suggested for Saskatchewan, since in certain years (chiefly 1927 and 1939) I did field work in the general neighbourhood of Cypress Lake and Val Marie without seeing any chats where specimens were taken by Mr. Taverner and Mr. Bard, respectively. Acute drought conditions in the early thirties may have stimulated northward distribution to some extent, but as already recorded, the species had become domiciled in Saskatchewan as early, at least, as 1921, but apparently became commoner after that date at more northern points.

The latest information chances to be my own, and this I take pleasure in recording. From June 15 to 18, 1941, I camped at the Frenchman River about 200 yards from the International Boundary. The valley here is several miles wide and between 300 and 400 feet deep, the bottom of which is approximately 2,500 feet a.s.l. It exhibits pronounced arid characteristics such as sparse, short-grass cover, an abundance of cacti, broad sagebrush and greasewood flats, rattlesnakes, horned lizards, etc. A few miles up the valley are several towns of the Black-tailed Prairie Dog. The river is bordered by rather extensive and very dense thickets of willows, buckthorn, green ash, wild rose, snowberry, gooseberry and sagebrush. Zonal conditions lean conspicuously to the Upper Sonoran.

No sooner was the locality entered than Long-tailed Chats were heard on every hand. This was at once recognized as an unusual experience. As the bottomland thickets were carefully explored in the days that followed, it was increasingly realized that *longicauda* was not only common, but actually abundant. Based on general field work and the observations of others, I am now of the opinion that this sector harbours a greater chat

5. Saunders, Aretas A. "A Distributional List of the Birds of Montana." *Cooper Ornith. Club, Pac. Coast Avifauna* No. 14, 1921, p. 150.



population than any other locality in the province. Since a climax condition is here indicated (probably exceeded but little, if any, by the better populated centres on the main Montana range) it is reasonable to suppose that it has existed here for an indefinite period irrespective of a comparatively recent increase in aridity. Like the prairie-dog, this northward intrusion is undoubtedly invited through the more suitable conditions presented in the Frenchman Valley as a northern tributary of the Missouri River.

It was estimated that along the river within a couple of hundred yards of camp, on either hand, at least a dozen chats inhabited the almost impenetrable thickets. Following the river meanders eastward, immediately north of the 49th parallel of latitude, comparable floral conditions obtained for a distance of about two miles; over most of this length chats were to be seen or heard at short intervals, thus revealing a remarkable density of population. The general impression was, however, that the birds were consistently less numerous as the river was ascended on the Canadian side of the border.

I hesitate to express an opinion as to the number of chats in this neighbourhood, but they may have totalled between fifty and one hundred. If the former figure should approximately apply (which strikes me as very conservative), then the average would have been about one pair in every 140 yards. By contrast is Mr. Potter's estimate<sup>6</sup> at Eastend—about 80 airline miles up the river—when he remarks, "In 1926 between this ranch and Eastend, a distance of five miles, there were four, representing presumably as many nesting pairs." In the border area studied, suitable habitat does not extend continuously in Canada for more than about half that distance, but, mile for mile, it appears at the least calculation that the chat population is probably ten or twelve times as great as in the Eastend sector. Such a diminution in num-

bers is precisely the result to be expected in a northward direction toward the ultimate limit of geographic distribution.

A further interesting feature is the gradual decrease in the number of chats which was noted even in the general vicinity of the International Boundary. Thus, no farther than a mile or so up the river the birds were clearly less numerous. This was especially notable beyond the point where the stream abruptly turns to the northwest in the northwest quarter of section 3, township 1, range 10; detached shrub sections were examined here where chats were rarely seen, or heard—an outstanding disparity in comparison with the highly vocal and abundant population a bare mile across country to the south. Other river-side thicket areas were visited in the same district from four to eight miles up the valley where not a single example was detected. In the light of these findings it is evident that the birds were grouped in the nature of a colony in the vicinity of the International Boundary and that their distribution northward up the valley was erratic and disjointed, as mentioned in the forepart of the paper.

Though many efforts were made to find a nest of the Long-tailed Chat at the border, the search ended in failure. Partly responsible was the difficulty of penetrating the dense stands of growth along the stream in which the buckthorn often presented an effective barrier; the birds seemed to be most common and provocative where the buckthorn jungles were the thickest. There is no shadow of doubt as to the species being a common breeder in this area and it was also unquestionably nesting at the time of the investigations, as Mr. Potter found a pair so engaged at Eastend as early as June 10. Finally it may be mentioned that five specimens were collected in the immediate vicinity of camp without causing any apparent decrease in the local population of these birds. Based on considerations of plumage and measurements I have no hesitation in referring them to the present sub-species.

6. Op. cit., *The Auk*, XLIV, 1927, p. 570.

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## CANADIAN NATURALISTS IN BRITAIN

M. D. Kinnear, Honorary Secretary, British Ornithologists' Club, British Museum of Natural History, Cromwell Road, London, S.W. 7, writes:

"It has been suggested that perhaps you might like to inform the members of the Ottawa Field-

Naturalists' Club, or any associated Societies, who are serving with the Canadian armed forces in this country, to write to me and I will endeavour to put them in touch with local ornithologists and also advise them about books. I shall be very happy to do all I can to help in this direction."

## A BEAVER CENSUS IN ALGONQUIN PROVINCIAL PARK, 1939-1940

*By* DONALD L. ROBB

---

A BEAVER CENSUS in Algonquin Provincial Park was carried out during the summers of 1939 and 1940, under the direction of Mr. F. A. MacDougall, at that time Superintendent of the Park. Because beavers have not since 1921 been subject to trapping in the park, except as a result of a limited amount of poaching, it is thought that the information derived from such a survey may indicate the density possible under natural conditions similar to those obtaining in the park and may also throw light on the extent to which habitat, especially forest type, affects beaver densities and conversely the effect of the beaver on the habitat.

Situated in the Ottawa drainage on the northern part of the Archean rock district of Central Ontario, Algonquin Park is admirably suited to the conservation of the beaver not only by being dotted with multitudes of moderately-sized lakes, ponds and other waters but also by possessing many valuable types of forest preferred by beavers as bark food. The network of trails, the many ramifying canoe routes, and the strategically placed rangers' cabins of the park contributed to the ease with which the survey was conducted.

The nature of the work—a count over an area of 2,749.9 square miles with but a small crew, necessitated that only a representative fraction should be examined and the probable beaver population estimated therefrom. Hence this was more of a beaver cruise, covering only 95 square miles or 3.45 per cent of the total area. While the area surveyed covered less than four per cent of the area of the park, yet it contained 10.19 per cent of the total beaver waters. The survey was accomplished in about 232 field days during 2,136 miles of travelling. There were seen altogether 370 occupied beaver houses, 598 beaver houses unoccupied, 561 beaver dams in use, and 893 beaver dams out of use, or a total of 968 beaver houses, and 1,454 beaver dams. As incidental observations on the same survey were seen 254 deer and 19 moose.

In the field the methods of the survey were modelled after the sample system. It was decided that a certain number of sample plots had to be so distributed throughout the entire park as to give results representative of general conditions

but with economic facility. Accordingly 95 work units or sample plots, each containing a square mile, usually equally spaced from two to five per township of about 81 square miles, were made delineators of the most beaver water possible in their respective areas, so as to concentrate the work and economize the travelling. This being the case, if all these sample plots were reduced to the density of beaver waters on an average park square mile, the 95 actual sample plots would have been equivalent to 280 sample plots each containing an average park density of beaver waters. Hence in obtaining the beaver population of the park, the density of beaver houses found on the average sample plot had to be reduced to correspond with a square mile in the park having average beavers' waters. Each sample usually took a day to examine but on an average 2.4 days were necessary, including complete examination, bad weather and travelling to and from the area. The plots were placed directly on the Algonquin, Sundridge, North Bay, and Haliburton maps of the National Topographic Series prepared from air photographs by the Dominion Government, or they were sketched and located using the original air photographs where portions of the park were not so mapped. Except on well-defined routes such as paths, wagon roads, highways, railroads, and canoe routes, the travelling was done mainly on foot by compass. All noteworthy biological observations with special emphasis on those concerning beavers were noted not only for the travel done on the mile square plots but also, though less intensively, on all off-square travelling. Information of primary importance consisted of the external condition of all beaver houses and dams encountered, the recording of feedbeds, cuttings, feedings, ages of cuttings, ages of occupations, drags and trapping signs. Other notes included deer, moose, grouse, and miscellaneous animals seen, as well as the types of bush and topography. Measurements of some beaver houses, dams, and cuttings were made to show general or extreme dimensions. Last but not least a floristic description of many meadows and ponds was considered absolutely essential. Except for one or two accidental close encounters no examination was made of the beaver itself. The notes were finished in



*An occupied beaver habitat in Algonquin Park.*

the field as permanent originals consisting of two parts: the notes completed in the plots, called square data, and the notes of travel off the plots called traverse data. The former possessed the most reliable information. Only these were regarded as having true sample significance. To facilitate the compilation of the monthly reports and to serve as daily permanent briefs, all notes were summarized daily on a special biological form entitled, "Daily Summary Form for Beaver Work for the Season of 19—".

The numerical results have been outlined above for the whole park. These figures really represent a mean of the beaver activity observed through the two seasons' work from spring to autumn when the population of beavers showed the least and most activity respectively. It may be surprising to learn that while 370 fresh beaver houses were recorded only 15 beaver occupants were seen representing about 0.82 per cent of the population believed to have been present. The distribution of the beavers in the park was found to be most concentrated throughout the centre, while they were notably scarcer in the country adjacent to the park line.

All sample areas, except one, possessed at least one beaver house. The greatest number of occu-

pied beaver houses found on one square mile was 10, while the most dams in use on one sample plot were 39. The average density of occupied beaver houses per sample plot was 2.24 fresh houses, corresponding to an average sample plot with a high average density of beaver waters, habitats or beaver basins as they are called, in this case 5.40 basins, which is 2.95 greater than the density of beaver basins on an average square mile of Algonquin Park. Thus the probable density of fresh beaver houses on one average square mile of Algonquin Park becomes 0.76 occupied beaver houses when the average density, of fresh beaver houses from the sample plots, has been accordingly reduced. The probable number of fresh beaver houses in Algonquin Park is therefore 2,090. This estimate is correct enough for practical purposes. For greater accuracy, a consideration of the so-called internal error, involved in the separation of fresh and dull (occupied and unoccupied) houses that closely resemble one another, changes the rough figure to 2.204 hypothetical fresh beaver houses.

The results of beaver activities gave the evidences pointing to various degrees of beaver occupation. These were the occupation features. Foremost of these was the beaver house, which though grading insensibly in construction to a



*Another type of beaver habitat in Algonquin Park.*

burrow type of habitation, occurring especially on the banks of big rivers, was found to consist typically of the dome, the base and the apron,—an extension over the entrance. The house was either fresh or dull (occupied or unoccupied), the former either a fresh new house or a fresh repaired house while the latter was a house in any stage of disuse; the oldest record was the scarcely discernible remains which proved to be at least 15 years old. Houses were graded according to the length of time a beaver occupied them; such as a transient house used by migrant beavers, a normal house not occupied for more than a year which seemed to be the average condition in the park, and the duplex house occupied for more than a year. This latter type of house was the kind that was found to have the greatest dimensions. One ocularly measured in which the beavers had stayed at least 4 years was 30 feet long, 20 feet wide and from 10 to 15 feet high. It was constructed of very large-sized fragments of mainly peeled aspen poplar stems. Houses were found to occupy three definite situations, 1. The shoreline location where the house had dry land behind it and a water frontage; 2. The bog location where the house had either bog behind it and a water frontage or bog all around it; 3. The

flooded location where the house was entirely or very nearly surrounded by water with or without drowned vegetation.

Beaver dams were almost a necessary adjunct to beaver houses on nearly all beaver occupations. As for houses, dams were graded fresh or dull (in use or out of use). They were either plug, dyke, or wing dams, with or without repairs, according to how they were built. The plug dam, simply a barrier across a channel though often attaining heights from 6 to 8 feet but generally about 3 feet high, was seldom over 25 feet in length, usually very straight or slightly bowed downstream. The dyke dam, just a barrier across a delta with no appreciable channel, was never very high but often quite long and very sinuous. One such dam though not strictly typical was at least nine hundred feet in length. The wing dam is the normal or average type of dam and combines features of one or more plug dams with a dyke dam. That is it is a dam across a definite channel as well as a portion of the flood plain in the basin. One measured was 515 feet long. The majority, however, were around one hundred feet. Dams backing floods, whereon was the beaver house, were called main dams, while all other attendant or dependent dams were named reserve dams. As the age of the occupation increases the number of

dams decreases. The situation of dams on lakes, creeks, etc., also affects dam frequency. On an average a single mature beaver occupation had one main dam and 0.5 reserve dams, while a typical occupation had one main dam and from two to four reserve dams. The greatest number of dams on any one occupation were mostly on creeks in new occupations, as, for example, a case of one main dam and 13 reserve dams above and below it. Beaver dams serve the chief purpose of increasing the availability of the landside of the shoreline upon which preferred bark food is located. They overcome what would be tiresome hauling over the flat unirrigated flood plains besides lessening the danger of terrestrial predations. The reserve dams appeared particularly useful in this respect. They occurred most characteristically and abundantly on creek occupations being, however, usually of a transient nature. When abundant the reserve dams were popularly called "golden stairs" by some of the trappers, no doubt alluding to the ease with which beavers could be taken from these situations.

The beavers' food was found to consist of a wide variety of succulents including land herbs, tree leaves, and aquatics; the barks of shrubs and trees; and roots or underground stems of either succulents or barks. Of the succulents, those particularly favoured were maple foliage, spruce foliage, grasses, leaves of raspberry, blue flag, yellow water lily, water shield, eel grass etc. Of the roots, yellow water lily and yellow birch were nibbled; of the barks, yellow birch, sugar maple, tag alder, hazelnut, white cedar, and eastern hemlock in descending order in the maple hardwood country, and aspen poplar, white birch, tag alder, sweet gale, and hazelnut in the same order in the burnt country. It is noteworthy that of all the ligneous species available to the beavers only jack pine, red pine, white elm, winterberry, mountain holly, dogwood, Labrador tea, and sheep laurel seemed to be untouched. Most of the coniferous species tasted were taken sparingly. Since the beavers fed differently according to the season and the types of vegetation in their habitats it is difficult to assess the relative importance of the beavers' foods. Without any order of precedence, however, the following foods were very much sought after; grasses, leaves of maple and raspberry, yellow water lily roots, barks of yellow birch, aspen poplar, and white birch.

In the fall, bark food and rhizomes of yellow water lily, etc. were seen stratified under water into piles or feedbeds placed not far from the beaver house. Alder branches usually formed a

radiating mat on top weighing down more preferred bark foods below. Generally the feedbeds were circular in outline not much more than 15 feet across being one to a house, but occasionally they were duplicated and circular or single and elongated up to about 40 feet long in big occupations.

In order to cut and graze the required land food the beavers wore back from their ponds to grazing or felling areas, paths, called drags which usually bifurcated towards the felling ends. The drags averaged 50 to 150 feet in length, sometimes reaching 200 to 275 feet but rarely going to 400 feet. They seldom took bold courses but rather followed draws, flats, or up not too abrupt slopes. Definite barriers for drags were cliffs, rough rocky ground and broad expanses of boggy ground besides areas barren of food. Cutting terminations of drags not infrequently ended in a veritable wasteful slaughter of trees, usually aspen poplar, white birch or sometimes sugar maple, but rarely white cedar, eastern hemlock, or yellow birch.

Beaver canals noticed as underwater extensions of the beavers' drags were obviously scooped for transporting the beaver food by water and as a safe approach to the shore. They quite frequently led out from places on the shore where there was some seepage or other trace of incoming water.

Beaver portages were occasionally observed between pit lakes in pot-hole country or connecting waters of different watersheds. While the former were usually quite short the latter were as much as 1,600 feet long. They served as migration routes.

The beaver habitat in the park refers to the special Archean substratum with sub-boreal environmental conditions favourable to a family of beavers. It consisted of simple or compound, rock bound or drift bordered basins, filled or unfilled with sediment, on which there were either one or both of a temporary or permanent flood, the former type being raised commonly by the beavers, the latter type rarely. Surrounding each of these beaver basins on the landside of the high water shoreline was a strip of land rising from the flood plain varying in width up to four hundred feet on which bark and herb food preferred by the beavers was able to flourish in modifications of either a hardwood or a burnt type of forest, while on the waterside of the high water shoreline was a strip of submerged land called a shelf on which aquatic vegetation preferred by the beavers had a foothold. Of the two sides of the shoreline with which the beavers were in contact the landside of the shoreline was

the most interesting and characteristic because it grew most of the beavers' food. Hence the composition and the vicissitudes of the landside food types contributed to a large extent the many factors governing the density of the beaver population and the age of the beaver occupation respectively. If the landside strips contained abundant and available poplar bark food, the beavers made often very close occupations, as many as four beaver families having been observed for one relatively small basin, while if the strips supported a high percentage of evergreens the occupations got farther apart and were more feeble. This was mostly the case in the burnt-over country. In the hardwood country on the other hand, in one respect probably related to the more insipid character of the bark food, in another to the more varied nature of the diet, the beaver occupations were at a distance respectful to the requirements of each other, such as one per basin. The beavers in such a country while not abundant and not scarce were regarded as in normal occupations. The regeneration of beaver food in the landside shoreline strip caused by the effect of the continuous beaver fellings determined in many ways the length of time a beaver occupation could persist. Beavers have at certain times of the year, particularly in the fall, an almost insatiable desire for felling bark food presumably to gather it for the winter. Once this food was cut down in most of the forest types the food was unable to regenerate itself, and as the

feelings progressed there was noticed a gradual transition to an ultimate strictly coniferous type consisting of white spruce, balsam fir, jack pine, red pine, white pine, eastern hemlock, white cedar, etc., in various proportions according to the situations, many trees of which were of little sustaining value to the beavers with the result that the beavers finally edged themselves out as their shores became more evergreen. This condition was most marked on the shores of basins in the typical birch-poplar-conifer burnt type where the factors of regeneration in a very short time entirely favoured the conifers not only by seed but also by releasing them from the competition of the food trees. On the other extreme in some of the hardwood regions where many of the food trees had a more even tolerance, the regeneration while eventually more coniferous took much longer to achieve the result. Not infrequently with moderate beaver plundering these hardwood types allowed a continuous but limited regeneration of some food trees, such as yellow birch, red maple, and possibly white cedar. Thus the burnt types of forest while promoting a close beaver occupation produced a relatively short period of occupation alternated with a period of desertion which depended on a catastrophic fire or wind-storm to end it. In the hardwood regions on the other hand the beaver occupations were never crowded and lasted longer alternated with ill-defined periods of feebleness or desertion depending on the forest type and the regeneration.

## BATS HIBERNATING IN THE DISTRICT OF THUNDER BAY, ONTARIO

By A. E. ALLIN

*City Hall, Fort William, Ontario*

**L**ITTLE STUDY of bats has been made in the District of Thunder Bay. Dymond (*Trans. Roy. Can. Inst.* Vol. 17, pt. 2, p. 240. 1928) reported *Myotis lucifugus lucifugus* from Lake Nipigon, and we have presumed that the small bats frequently seen flying about the streets of Fort William and Port Arthur belonged to the same species. Although the bats encountered on opening summer cottages are undoubtedly Big Browns, I do not believe this species has actually been identified locally. Our attention had already been drawn to the subject of hibernation of bats by articles in this journal by Hitchcock,

(54:55-56. 1940; 55:46. 1941), and Hitchcock and Reynolds (54:89. 1940), when a popular article appeared in the *Globe and Mail* on November 18, 1941, entitled "Mystery of Bats' Hibernation Place Provides Study for London Savant" (Hitchcock). We then recalled that Mr. C. E. Garton, well-known Naturalist of Port Arthur, had told us that on October 9, 1934, he had found a cave containing an estimated 5,000 bats. None were found in the cave when he examined it once in mid-summer but on October 10, 1939, he again found large numbers of bats in this cave. On both occasions they were semi-active.

On November 22, 1941, accompanied by Messrs. Garton and K. Hutton we visited this cave located near the shore of Cavern Lake, 30 miles north-east of Port Arthur and 7 miles from the north shore of Lake Superior. The lake, which is very narrow, occupies a valley in the heavily wooded country typical of this region. The north-eastern shore of the upper end of the lake is bordered by a high precipitous cliff rising several hundred feet above the surface of the lake. The cave, or cavern, to which the lake owes its name, lies at the base of this cliff not far from the shore of the lake and appears to be due to a structural disturbance in the rock. Entrance to the cavern, by means of an opening 15 feet wide and 4 feet high, admits one into the cave where Garton found so many bats on the above-mentioned occasions.

The cave is in the shape of a half-section of a cone with a base 20 feet wide immediately inside the entrance, and a long axis inclined back and down at an angle of 30° for 200 feet. The vaulted roof has a maximum height of 15 feet. Large flakes of rock, separated from the roof due to erosion, have piled up on one side of the floor so that one has an impression that the floor is tilted at an angle of 45 degrees. Although there was none at the time of our visit, ice is usually present at the back of this cave until late summer, and for many years it has been used by fishermen for temporarily storing their fish. The air in this outer cave was cool and small icicles hung from the roof. Some 50 feet from the entrance of this "outer" cave we found a small passageway at the junction of roof and floor by means of which we entered an "inner" cave which was some 8 feet high and 20 feet square. Here the air was warm and "heavy".

Although the day was bright and clear and the ground was covered by 3 inches of snow the inner cave and the greater part of the outer cave were in stygian darkness. The official temperatures at Port Arthur for November 22 were maximum 30°, minimum 15°, on November 23, the maximum was 15°, the minimum 6° (Fahrenheit).

Twelve bats were found in the outer cave. Of these, two Big Browns and one small brown were hanging singly, by their toes from the ceiling. A cluster of seven small browns were similarly suspended. The other two were small brown bats and were wedged in crevices of the rocky roof. In the inner cave we discovered an estimated 1500 small brown bats, hanging from the ceiling, singly, in pairs, or in clusters of as many as twelve bats. Some were covered with drops of moisture. All

were dormant, although some showed evidence of life by uttering squeaks and struggling feebly. Very few droppings were observed on the floors of the caves.

The 12 bats from the outer cave and 130 from the inner cave were collected in a sack. On the return trip of three miles to our car some became more active and this activity increased in the car on the journey homeward. Although left in a cool protected room overnight they were quite active the next morning and flew about rapidly in the warm room where they were released.

The 142 bats thus obtained were identified as follows: Big Brown Bats, *Eptesicus fuscus fuscus*, 2 males; Little Brown Bats, *Myotis lucifugus lucifugus*, 99 males and 39 females; Long-Eared Brown Bats, *Myotis keenii septentrionalis*, 2 females. The specimens, with the exception of one female Little Brown, were subsequently presented to the Royal Ontario Museum of Zoology where the above identifications were confirmed and where above identifications were confirmed and where they are now available for study. All the bats were quite fat. Immediately after being killed, the Big Brown Bats weighed 21.4 and 16.8 grams respectively, and the Long-Eared Browns 7.20 and 6.55 grams. The Little Browns showed an interesting range in weights. The males averaged 8.80 grams, the largest weighing 9.65 grams, the smallest 7.65. The largest female weighed 11.35 grams and the smallest 6.90. The average weight of the females was 9.11 grams.

The discovery of these hibernating bats is of interest from several standpoints. It apparently extends the known range of *Myotis keenii septentrionalis* in Western Ontario for many miles\*. It definitely establishes the presence of *Eptesicus fuscus fuscus* at the head of the lakes. It is of interest that there should be such a predominance of males (in summer-colonies males are rarely found). Finally it is unusual that the first large aggregation of bats found hibernating in Canada should be in a region where no study of bats has previously been made, and where even suitable caves are of very rare occurrence.

\* Miller and Allen (*The American Bats of the Genera Myotis and Pizonyx*, U. S. N. M., Bull. 144, 1928, 101) list records of *septentrionalis* from N.S., N.B., P.Q., and Ontario west to Michipicoten, as well as from northern Minnesota and North Dakota. Stuart Criddle (*Can. Field-Nat.*, 46: 189, 1932) extended the known northwestern range to Manitoba by putting on record two specimens taken at Souris, Manitoba. The known western limits of the subspecies *septentrionalis* are near the western parts of Manitoba, North Dakota and South Dakota, and there is a wide gap of approximately 800 miles between the known range of this form and the typical form *M. k. keenii* in western British Columbia. — R. M. ANDERSON.

# NOTES ON THE FAUNA OF BRUCE PENINSULA, MANITOULIN AND ADJACENT ISLANDS

By M. Y. WILLIAMS

Department of Geology and Geography, University of British Columbia

(Concluded from page 70)

## MAMMALS.

HOARY BAT. *Nycteris cinerea*.

Manitoulin Island. 1915, September 4, one taken (N.M.C.) at Honora; September 30, bats seen at Helen Bay; October 16, bats common at Meldrum Bay.

BLACK BEAR. *Euarctos americanus*.

Bruce Peninsula. 1913, formerly very common, killing sheep and hogs; tracks still common. 1914 August 10, tracks of an old bear and young near Miller Lake.

Manitoulin Island. 1915, October 6, a female bear chased the writer's cook near Cook's Wharf, Bayfield Sound; the track of two cubs were found nearby; bears were reported to have driven a sheep onto the wharf, where they killed it, a short time before. 1935, July 13, bear tracks were noted near Cape Smith. Bear are reported as having been very plentiful on the island in early days.

RACCOON. *Procyon lotor*.

Bruce Peninsula. 1913, tracks numerous. 1914, August 10, tracks common near Miller Lake.

MINK. *Mustela vison*.

Bruce Peninsula. 1912, October 3, one at Cabot Head.

Fitzwilliam Island. 1915, one on July 14.

Manitoulin Island. 1915, September 3, one at Honora.

OTTER. *Lutra canadensis*.

Bruce Peninsula. 1913, otter reported as occasionally seen in the past.

SKUNK. *Mephitis mephitis*.

Manitoulin Island. 1915, August 25, one seen at Honora; September 24, one at Gore Bay. 1935, about July 15, a skunk killed by a car near Ten Mile Point.

RED FOX. *Vulpes fulva*.

Bruce Peninsula. 1913, September 10, one seen near Cape Hurd; foxes were reported as being common.

BRUSH WOLF. *Canis latrans*.

Manitoulin Island. Not heard of by writer in his work on the island from 1912 to 1920. In 1935, they were reported as common, a bounty being paid on them; the "brush" was poorly developed. A skull is in the writer's collection.

TIMBER WOLF. *Canis lycaon*.

1913, well-informed "old-timers" stated there were no reports of wolves on Bruce Peninsula by the earliest settlers. An occasional wolf was said to find its way to Manitoulin Island from the north shore.

BOBCAT. *Lynx canadensis*.

Bruce Peninsula. 1913, reported as common at Lion Head, where they stole chickens; the exact species has not been verified.

WOODCHUCK. *Marmota monax*.

Bruce Peninsula. 1914, August, one observed. 1915, June 14, common in Purple Valley.

Manitoulin Island. 1912, reported as absent south of Lake Manitou. 1935, July 3, one seen near Little Current; the only record for the island.

EASTERN CHIPMUNK. *Tamias striatus*.

Manitoulin Island. 1915, July 28-October 10, common everywhere. 1920, June 5-July 17, fairly common Manitowaning and vicinity. 1935, fairly common everywhere.

RED SQUIRREL. *Sciurus hudsonicus*.

Bruce Peninsula. 1915, June 9, two at Colpoy Bay.

Manitoulin Island. 1915, July 20-October 15, fairly common everywhere. 1920, June 5-July 17, fairly common. 1935, apparently scarce, as not recorded.

NORTHERN GRAY SQUIRREL. *Sciurus carolinensis*.

Bruce Peninsula. 1913, September 24, one seen at Wiarton. 1915, June 24, one seen at Barrow Bay. Both records were of the black variety.

MUSKRAT. *Ondatra zibethica*.

Bruce Peninsula. 1915, June 18, one at Cape Croker.

Manitoulin Island. 1915, August 17, one at Perch Lake; September 2, one at Honora; September 21 and 23, one seen each day at Gore Bay; October 8, one at Cook's Wharf.

PORCUPINE. *Erethizon dorsatum*.

Bruce Peninsula. 1914, August 6, one near McVicar's; August 17, one large dark one near Halfway Rock. 1915, July 6, took a male at Cabot Head (N.M.C.).

VARYING HARE. *Lepus americanus*.

Bruce Peninsula. 1912, October 3-6, one at Cabot Head. 1914, August, three seen. 1915,



June 10-23, eight seen between Colpoy Bay and Hope Bay.

Manitoulin Island. 1912, September 19, common at West Bay. 1915, July 17-October 19, twenty-three seen from South Baymouth around shores to Bayfield Sound; one died by tent at Honora. 1920, July 1, two seen at Fossil Hill. 1935, June and July, fairly common.

VIRGINIA DEER. *Odocoileus virginianus*.

Bruce Peninsula. 1913, formerly very common; hunting with dogs blamed for scarcity; a close season for three years. 1914, August 10, fresh tracks at Miller Lake.

Fitzwilliam Island. 1912, September 6, fairly common. 1915, July 12-16, common on west end of island and killed freely by fishermen, beach-combers and Indians; saw remains of doe and buck not two weeks old.

Manitoulin Island. 1912, reported to be common. 1915, August 16 and 17, a doe and two fawns at Pine Lake. 1935, common; Puly 9, one seen at Wekwemikong; two spotted fawns seen July 27, near South Bay.

CARIBOU. *Rangifer caribou*.

This species was said to have been on Manitoulin Island before white settlement.

#### AMPHIBIANS.

AMERICAN TOAD. *Bufo americanus*.

Manitoulin Island. 1915, September 23 and 25, one seen each day at Gore Bay.

TREE-TOAD. *Hyla versicolor*.

Manitoulin Island. 1915, October 12, one at Burns Harbour.

BULLFROG. *Rana catesbeiana*.

Manitoulin Island. 1915, September 3, heard at Honora.

LEOPARD FROG. *Rana pipiens*.

Manitoulin Island. 1915, July 19-October 13, from South Baymouth around the coast to Burns Harbor, fairly common.

Cockburn Island. 1915, October 20, seen here.

#### REPTILES.

SMOOTH GREEN SNAKE. *Ophedodry vernalis*.

Manitoulin Island. This is the most distinctive snake on the island. 1912, seen at Fossil Hill. 1915, August 31, one recorded at Honora. 1935,

August, two specimens sent to National Museum from near South Baymouth.

NORTHERN WATER-SNAKE. *Natrix sipedon*.

Bruce Peninsula. 1913, very common (large brown snake sp.) in joints of limestone north of Lion Head in early September.

Fitzwilliam Island. 1915, July 12, two seen at western end of island.

Manitoulin Island. 1915, July 19, one at South Baymouth; 21st, one seen at Tamarack Cove; 24th, one killed at Tamarack Cove. 1935, July 3, a 24-inch individual at Little Current; July 5, one seen at Little Current.

GARTER SNAKE. *Thamnophis sirtalis*.

Fitzwilliam Island. 1915, July 15, one seen.

Manitoulin Island. 1915, July 19-Oct. 18, fourteen recorded from South Baymouth around the coast to Meldrum Bay. 1935, June 26, one at Little Current; July 26, common at Cape Smith.

RATTLE-SNAKE. MASSASAUGA. *Sistrurus catenatus*.

Bruce Peninsula. The northern, more rocky part of the peninsula was notorious for rattle-snakes. In 1914, they were unusually plentiful. Mr. Tom Robins of McVicar sold a horse to a fish pedlar; the horse started to graze by the side of the road and was bitten by a "dummy" rattler (one that had lost its rattles), and died about August 1. Mrs. Robbins shot two near her home, and Mrs. Pyke reported their first appearance on her farm near Miller Lake. The writer shot one with three rattles (August 7), and found a dead one with nine rattles (August 6), both near McVicar.

Fitzwilliam Island (popularly known to fishermen as Rattle-snake Island). 1915, July 12, killed one; 14th, found one dead, both at west end of island at "Indian Harbor." This is the northern limit of the rattle-snake. No records were discovered for Manitoulin Island, and the best authorities said they had never seen any. As Lake Huron was once much higher, and was never lower to our knowledge, the occurrence of rattlesnakes on this island is difficult to explain.

SNAPPING TURTLE. *Chelydra serpentina*.

Manitoulin Island. 1915, October 6, one large one seen at Cook's Bay on Bayfield Sound.

PAINTED TURTLE. *Chrysemys bellii*.

Manitoulin Island. 1935, very common in ponds and water-channels of Cloche Island; July 3, twenty-four adults and several very small young seen; on the 6th, twenty-nine adults and three young. Not recorded for Manitoulin Island itself.

## BOOK REVIEWS

HISTORY, RANGE AND HOME LIFE OF THE NORTHERN BISON (*Wood Buffalo Park, Northern Alberta and District of Mackenzie, N.W.T., Canada*); by J. Dewey Soper; *Ecological Monographs*, 11:347-412, October, 1941.

The content of this scholarly, thorough and very readable treatise, by one of our best known field-naturalists, is well indicated by the title. Approximately twelve pages are devoted to the history and range of the wood bison; the remainder of the paper is a detailed study of its ecology. In spite of the extensive literature on the animals and on the vast park that is their home, this is the first ecological treatise devoted to them.

The great majority of the bison range in an area of 8,200 square miles within the 17,300 square miles of the park. In the winter they are further concentrated on 1,300 square miles of winter range, which the author found to be nevertheless in good condition, with large quantities of feed unconsumed each year. The wintering population on this main winter range is estimated at 9,000 to 10,000 individuals. The total population

is estimated at 12,000. The descendants of the bison brought from the former Wainwright Buffalo herd are not only mingling with the wood bison; they are also taking on the habits and appearance of their northern relatives. While there are still pure wood bison in the park, the herd as a whole is well mixed and doomed to complete mixture. The reviewer recalls that although the two herds in southern Alberta, at Elk Island Park and (formerly) at Buffalo Park, were identical in genetical composition, the Elk Island Park herd, on a wooded range, was always considered darker. If a hundred genuine wood bison could be mingled with the herd at Elk Island Park, how would our mammalogists fare at the task of sorting them?

The details given by this paper on the daily life of the bison, their habits and relations to their environment, are too numerous even to list in a review. They form a solid body of facts which will undoubtedly be quoted and requoted in both popular and scientific works on natural history for generations to come.—C.H.D.C.

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## CONTENTS

Page

The Neo-Triassic <i>Cassianella</i> Fauna of Tyaughton Creek Valley, B.C. By F. H. McLearn	99
Notes on the Willows of Saskatchewan. By W. P. Fraser	104
The Occurrence of the Dolly Varden Char in Salt Water off British Columbia. By J. R. Dymond	110
Miscellaneous Contributions from the National Herbarium of Canada, III. By A. E. Porsild	112
The Buckeye Butterfly ( <i>Junonia coenia</i> Hubn.) in Ontario. By L. H. Beamer	113
Harlan Ingersoll Smith, 1872-1940. By D. L.	114

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# The Canadian Field-Naturalist

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Museum of Comparative Zoology  
JAN 18 1943

No. 7

## THE NEO-TRIASSIC CASSIANELLA FAUNA OF TYAUGHTON CREEK VALLEY, B.C.\*

By F. H. McLEARN

Geological Survey, Department of Mines and Resources, Ottawa

**A**N INTERESTING FAUNA of Neo-Triassic age has been collected in the valley of Tyaughton creek, Bridge River district, B.C., by C. E. Cairnes and other field officers of the Geological Survey. It occurs in an unnamed formation of grey and brownish-grey limestones and calcareous sandstones beneath dark, mostly argillaceous, beds of early Jurassic age. It is distinguished by a variety of *Cassianella beyrichi* Bittner and by several very ornate species of *Myophoria*.

The pelecypods of this fauna include: *Macrodon* (*Catella*?) *tyaughtonae* n. sp., *Pinna* n. sp.?, *Pteria* cf. *sturi* Bittner, *Oxytoma* cf. *intermedia* Emmrich, *Cassianella beyrichi* var. *crickmayi* n. var., *Plicatula*? n. sp.?, *Enantiostreon* sp., *Myophoria cairnesi* n. sp., *M. suttonensis* Clapp and Shimer, *M. columbiana* n. sp., *M. zeballos* n. sp., *M. adornata* n. sp., *Pecten tyaughtonae* n. sp., *P. pontianus* n. sp., *P. cadwalladerensis* n. sp., *P. cf. nihanianus* McLearn, *P. cf. saccoi* Parona, *P. (Variamusium?)* sp., *Lima* sp., *L. (Plagiostoma)* sp., *Mytilus?* *shulapsensis* n. sp., *Pleuromya?* cf. *elongata* Schlotheim and *Astarte* sp. The cephalopods include *Orthoceras* sp., *Diphyllites* sp., *Arcestes* sp., *Placites* sp. and *Paracladiscites* sp.

The ammonoid genera *Diphyllites* (or *Rhaphyllites* of some authors) and *Paracladiscites* are all of Neo-Triassic age. *Placites* is not known earlier than late Karnian and *Paracladiscites* of the cone shape of the Tyaughton shells is mostly of Norian time. If *Myophoria suttonensis* is actually associated with *Choristoceras* in the Sutton limestone and is a short ranging species it records Norian or even Rhaetian time. The evidence of the ammonoids thus undoubtedly indicates a Neo-Triassic dating and approximately a Norian age within the Neo-Triassic.

Some of the pelecypods of this fauna occur elsewhere in British Columbia and afford a correlation of the Tyaughton Creek beds with those of other parts of the province. Thus *Myophoria suttonensis* is present in the Sutton limestone of Cowichan lake, Vancouver island, where it has been recorded by Clapp and Shimer. *Myophoria adornata* is in a collection, made by Rice, from the Tulameen formation, northwest of Aspen Grove, B.C. *Myophoria zeballos* is in a collection made by Gunning from Zeballos river, Vancouver island. A species close to *Plicatula*? n. sp.?

is in a collection made by Gunning from the Bonanza series on the west shore of Victoria lake, Vancouver island, B.C. Specimens similar to those of *Mytilus?* *shulapsensis* from the Tyaughton valley have been collected by Lees from the Lewes River formation on Lewes mountain, Yukon territory.

### SYSTEMATIC PALAEONTOLOGY

The palaeontological studies are based on specimens collected by C. E. Cairnes, C. H. Crickmay and Victor Dolmage.

All types are in the collections of the Geological Survey at Ottawa, Ont., Canada.

#### *Macrodon* (*Catella*?) *tyaughtonae* n. sp.

Plate 1, figure 1

This is a small, subrhomboidal, fairly convex species with a long hingeline and oblique anterior and posterior margins. On the surface of the shell a broad, shallow furrow extends from the umbones to the ventral margin, becoming broader and more shallow as it approaches this margin. On the mold of the interior this furrow is deeper and records a radial ridge on the interior of the shell. The surface flattens or is less convex in the postero-dorsal angle. The surface is ornamented with fine, radial costae, apparently lacking in the radial furrow.

This is a smaller species than *Macrodon* (*Catella*) *latipecta* Healey from the Rhaetian of Upper Burma and has radial ornament, lacking in the Burma shell, and weaker concentric ornament.

Measurements of holotype: height, 4.5 mm.; length, 6.7 mm.

*Name.* Tyaughton, a geographic name.

*Types.* The holotype, cat. no. 9426, is from about 7500 feet north of Tyaughton creek and about 9000 feet north-northwest of the mouth of Camp creek.

#### *Cassianella beyrichi* var. *crickmayi* n. var.

Plate 1, figures 5 to 9

The body of the left valve is relatively slender, being short and high, a little inclined to the vertical axis and strongly incurved. The axis or "back" of the shell is somewhat flattened to gently convex, except on the umbones where it is well-rounded. The anterior surface is abruptly and deeply inflected and forms a shoulder with the axial part or "back" of the shell. The posterior surface is also deeply inflected and is separated from the "back" of the shell by a pronounced shoulder or by two shoulders with a shallow furrow or flattened

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area between them. The anterior ear is large, somewhat mucronate and is separated from the body of the shell by a deep furrow which is marked on the interior by a strong ridge. The posterior ear is smaller and mucronate. The surface is covered with fairly even and well-marked growth lines with, in some specimens, distant and irregular varices of growth.

The body of the right valve is concave, as well as the wings of this valve. It is ornamented with radial, very fine costae.

This species shows much variation, particularly in the relative height, slenderness and convexity of the body of the shell.

In form, size, and surface ornament the Tyaughton shells are very similar to the type of *Cassianella beyrichi* Bittner, as figured by Goldfuss in his *Petrefacta Germaniae* (See plate 116, fig. 10e) under the name of *Avicula gryphaeata* Munster. The shells of our variety, however, are higher and more slender in shape. Compared with the illustrations of Bittner (1895, pl. 6, figures 16-21) the shells of our variety are higher and more slender in outline and the posterior ear is smaller and more mucronate. Compared with *Cassianella tectiformis* Boehm from Barinsel the Tyaughton creek shells are larger, are relatively higher and more slender in outline and have a smaller anterior wing. Compared with *Cassianella verbeeki* Krumbeck from Sumatra our shells are much larger and lack the distinct keel in the posterior part. Although our shells superficially resemble *Hoernesia bhavoui* Diener from the Triassic of Kashmir in general outline and form they lack the furrow on the umbones, are larger and have a smaller posterior wing.

Measurements of the holotype are: height, 51 mm.; length, 28.5 mm.

*Name.* For Dr. C. H. Crickmay.

*Types.* The holotype, cat. no. 9431, is from about 7500 feet north of Tyaughton creek and about 9000 feet north-northwest of the mouth Camp creek. The paratype, cat. no. 9430, (paraplastotype, cat. no. 9430a), is from Last creek, the paratype, cat. no. 9432, is from the ridge east of the south end of Spruce lake, the paratype, cat. no. 9433, is from the Tyaughton creek valley and the paratype, cat. no. 9434, is from about 9500 feet northeast of Tyaughton creek at the mouth of Small creek.

#### Genus MYOPHORIA Bronn

*Myophoria columbiana* n. sp., with radial costae, appears to belong to the group of *Myophoria costata*, that is the *Flabellatae* of Waagen or subgenus *Costatoria* Waagen. If the group of *Myophoria decussata*, in the broad sense, be subdivided into the groups of *M. decussata* and *M. elegans*, the Tyaughton species *Myophoria adornata* n. sp. and *Myophoria zeballos* n. sp. fall within the restricted group of *M. decussata*, that is the group with both radial and concentric ornament on the sides of the shell and with concentric or with both radial and concentric ornament on the area. If *Gruenewadia* Wohrmann, 1889, is invalidated by *Gruenewaldtia* Tschernyshev, 1885, as it appears to be, a new subgeneric name will be required for this group. In spite

of the radial ornament of *Myophoria cairnesi* n. sp., it is possible that it does not fall within the group of *M. costata*, that is subgenus *Costatoria* Waagen, but in the group of *M. decussata*; for the umbo of *M. cairnesi* apparently has both concentric and radial ornament; better specimens, however, are required to test this possibility.

It seems best to restrict *Elegantinia* Waagen to the group of *Myophoria elegans*, as the true *Elegantines*, with *Myophoria elegans* Dunker as the genotype. In this restricted group of species, with concentric ornament alone on both sides and area, should be included *M. elegans* Dunker, *M. urd* Boehm, *M. inflata* Emmerich and similar species. It is from this Triassic group that Jurassic species of *Trigonia* like *Trigonia inexpectata* Jaworski from the Lower Jurassic of South America, some shells from the Jurassic of northern British Columbia and an undescribed species from the Lower Jurassic of the Yukon could be derived with little modification. From the same source but with greater modification and change in ornament may have come the *clavellatae*, *undulatae* and *scaphoideae* sections of Jurassic *Trigonia*. The Jurassic *costatae* section of *Trigonia*, however, probably had a different source in the Triassic and from species like *Trigonia* (or *Myophoria*) *gaytanni* Klipstein and *Trigonia* (or *Myophorina*) *zlambachiensis* Haas.

#### *Myophoria columbiana* n. sp.

Plate 2, figures 11 to 13

This species is moderately convex, longer than high and somewhat subrectangular in outline. The anterior and ventral margins are somewhat convex and the posterior margin nearly straight and oblique. The umbones are anterior in position and the beaks incurved and very slightly curved backward. The posterior keel or *Myophoria* ridge is somewhat angular, but only moderately elevated and convex forward. The area is divided by a very faint, median, radial furrow. The surface is ornamented with from about 6 to 8 radial ribs, convex forward, which bear relatively large, irregular, but somewhat rounded, tubercles and also concentric rather even, striations. The marginal carina or keel apparently bears small, irregular tubercles. The area is ornamented with fairly irregular, concentric striations. There is a row of tubercles along the dorsal border of the area. On the interior, a low ridge divides the posterior part of the area.

Measurements of paratype, cat. no. 9445, are: height, 28.3 mm.; length, 38.5 mm.

This species differs from most species of the *Costatoria* group in the relatively large tubercles on the ribs. *Myophoria nuggetensis* Trechmann from New Zealand has similar large tubercles and similar ornament on the area and is probably very close to our species. The New Zealand species, however, is more triangular and less elongate in outline, is more convex, has a more projecting umbo and a large radial furrow dividing the area. *Myophoria beringiana* Smith from Gravina island, Alaska, has a more prominent and projecting umbo.

*Name.* Columbianus, for British Columbia.

*Types.* The holotype, cat. no. 9443, (holoplastotype, cat. no. 9443a), and the paratype, cat. no. 9445, are from a ridge east of the south end of Spruce lake, at an elevation of about 6090 feet.

*Myophoria cairnesi* n. sp.

Plate 2, figures 4, 5

This is a fairly large, very convex species, somewhat longer than high. The beaks are incurved and about orthogyrally. The marginal carina or keel on the postumbonal slope is high, angular and curved. The area dorsal to this keel is fairly wide. The sulcus anterior to the keel is wide and of moderate depth. The body of the shell is covered with numerous, radial costae, bearing tubercles. The 4 or 5 posterior-most radial costae in the furrow in front of the keel are smaller than the others and bear proportionally smaller tubercles. Anteriorly the radial costae are more slender and more crowded. The keel is notched by narrow furrows, setting off an irregular, low, serial, tubercle-like ornament. The area above the keel has even, radial, coarse striae and posteriorly some concentric striae of the same strength.

The size of the holotype is much below the average of the species and some specimens are more than twice as long as the holotype. The type was chosen because of its good preservation.

*Myophoria suttonensis* Clapp and Shimer from the Sutton limestone Lake Cowichan, Vancouver island, is smaller, has a less elevated keel, fewer radial costae, relatively smaller tubercles on the costae and no radial ornament on the area.

Measurements of the holotype are: Height 22.7 mm.; length 27.0 mm.

*Name.* For Dr. C. E. Cairnes.

*Types.* The holotype, cat. no. 9440 (holoplastotype, cat. no. 9440a), is from the ridge at the head of Grizzly creek.

*Myophoria adornata* n. sp.

Plate 2, figures 1 to 3

This is a fairly convex species, considerably longer than high. The beaks are incurved and at the tip also slightly curved backward or slightly opisthogynally. The keel or "Myophoria ridge" is elevated and curved. Anterior to this keel is a shallow furrow. The area above the keel is divided by a radial furrow. Numerous ribs are parallel to the growth lines except near the anterior border where they are about at right angles to this border. Two slender radial ribs lie in the furrow in front of the keel. Anterior to this are about 14 stronger radial ribs which however become progressively more slender anteriorly. The first and strongest of the radial ribs reaches to well up on the umbo, the remainder are progressively shorter anteriorly. The radial ribs are absent in the anterior-most part of the shell. Where the radial and concentric ribs cross there are short projections or incipient spines. The area is ornamented

with concentric, even striations. The keel is corrugated and the carina between the area and the escutcheon bears a row of small tubercles.

The holotype and paratype are, respectively, the external and internal molds of one and the same valve.

*Myophoria margaritifera* Boehm from Barinsel is smaller, has fewer, radial ribs and a more ornate area. *Myophoria heslingtonensis* Trechman from New Zealand is smaller, has fewer and stronger, radial ribs and a more ornate area, including the "fine raised points". *Myophoria grahami* McLearn from the Peace River foothills is much smaller, has finer, concentric costae and fewer radial costae.

Measurements of the holotype are: height, 22.0 mm.; length, 26.5 mm.

*Name.* Adornatus, embellished.

*Type.* The holotype, cat. no. 9438, (holoplastotype, cat. no. 9438a) and the paratype, cat. no. 9439, (paraplastotype, cat. no. 9439a); are from the ridge at the head of Grizzly creek.

*Myophoria zeballos* n. sp.

Plate 2, figures 6 to 8

This is a moderately, convex species about as long as high. The area is wide and separated from the anterior part of the shell by an elevated keel or marginal carina. The anterior part of the shell is ornamented with a net-like design of concentric and radial costae with very short spines or tubercles at the intersections. On the umbones the ornament is somewhat different. The concentric costae are as strong there as on the remainder of the shell, but the radial costae are weaker and the meshes are oblong, not square. The keel is ornamented with very short, curved, transverse costae. The area, behind the keel, is covered with concentric, slightly curved striae.

The ornament on the umbones resembles that on the entire surface in front of the keel in *Trigonia textilis* Lees from the Lewes River formation in the Leberge area, Yukon. There are more radial costae than in *Myophoria adornata* n. sp. A species from Barinsel, *Myophoria nathorsti* Dames, has a somewhat similar mesh-like ornament with tubercles, but the radial ribs are much weaker, relatively, the furrow anterior to the keel is much wider and there are radial striae or fine costae on the area behind the keel. *Myophoria multicostata* Körner from Peru is much smaller, has relatively coarser meshes in the ornament and a relatively wider furrow anterior to the keel.

Measurements of the holotype are: height, 30.0?; length, 29.9 mm.

*Name.* Zeballos, a geographic name.

*Type.* The holotype, cat. no. 9442 (holoplastotype, cat. no. 9442a), is from the Bonanza group of the Zeballos area, Vancouver island, B.C. The paratype, cat. no. 9441, is from Tyaughton creek, three-quarters of a mile above Spruce Lake creek.

*Pecten tyaughtonae* n. sp.

Plate 2, figures 14 to 16

This is a moderately convex species, varying from a little longer to a little shorter than high in outline. The apical angle is about 90 degrees or more. The body of the shell is ornamented with numerous, radial costae, in places alternating in size, bearing irregular tubercles wider than the costae. The number, thickness and elevation of the costae vary considerably and the tubercles may be irregularly rounded, lengthened radially or lengthened concentrically. There are fine, fairly even, concentric striae or growth lines. In one specimen, an oblique striation was also noted. In some specimens the concentric ornament is stronger on the umbones, forming a lattice-like ornament. There are few tubercles at this stage. When this concentric ornament declines with growth, the tubercles are formed at what correspond to the intersections in the lattice ornament. The wings are not completely preserved, but both bear a few radial costae.

Measurements of the holotype are: height, 33.5 mm.; length, 32.5 mm.

*Pecten cisonensis* Polifka from the Ladinian of the southern Alps has a somewhat similar but finer, surface ornament, a smaller apical angle and a triangular outline. *Pecten margaritiferus* Bittner from the Karnian of Bakony has a somewhat different and more regular costate-tuberculate ornament and a finer, apical ornament.

*Name.* Tyaughton, a geographic name.

*Types.* The holotype, cat. no. 9448, (holoplastotype, cat. no. 9448a), and the paratype, cat. no. 9447, are from about 1100 feet due north of Tyaughton creek at the mouth of Camp creek, at an elevation of approximately 7700 feet. The paratype, cat. no. 9446, is from the mouth of Spruce Lake creek.

*Pecten cadwalladerensis* n. sp.

Plate 1, figures 2 to 4, 10

The left valve is somewhat inflated and somewhat variable in outline, but mostly about as high as long. The hingeline is more than half the length of the shell. The umbones narrow rapidly toward the apex. The anterior wing is larger than the posterior, but the wings are not well demarcated from the body of the shell. The surface of the shell, including that of the wings, is ornamented with numerous, radial, low costae, wider than high. Although in some specimens the costae are of even size, in other specimens the costae are uneven and alternate in size. The spaces between the costae are narrower than, to about as wide as, the costae. Most specimens are small like the holotype, but some imperfect specimens show that it grew to a larger size.

Some specimens of a right valve, having a similar outline and similar surface ornament, may be of this species, although this cannot be proved. They are, on the average, larger than the left valves described in the foregoing paragraph. They are almost flat, are about as high as long to somewhat longer than high and have an apical angle greater

than a right angle. The anterior wing is long, the posterior short. The surface is ornamented with numerous closely spaced, radial lowly rounded, fine costae with considerable alternation of size. The largest specimen shows bifurcation of the major costae at the extreme, ventral end of the shell.

The left valve, compared with the left valve of *Pecten inaequistriatus* Munster, as figured by Goldfuss, has more rapidly narrowing and triangular umbones, a low depression along the postero dorsal border, more numerous, more flatly rounded and, on the whole, more even, radial costae. The left valve of *Pecten subdextilis* Krumbeck is larger than most of the known valves of *Pecten cadwalladerensis* and has better defined wings.

Measurements of the holotype are: height, 20.3 mm.; length, 18 mm.

*Name.* Cadwallader, a geographic name.

*Types.* The holotype, cat. no. 9429, (holoplastotype, cat. no. 9429a), and paratypes, cats. nos. 9427 and 9428, are from Castle creek at an approximate elevation of 6300 feet. The figured specimen of the right valve, cat. no. 9435, is from Tyaughton creek, three-quarters of a mile above Spruce Lake creek.

*Pecten pontiamnis* n. sp.

Plate 1, figures 11, 12.

The holotype, a specimen of the left valve, is quite convex in the dorsal part of the shell, but flattens towards the anterior, ventral and posterior borders. The posterior wing is smaller than the anterior and is better demarcated from the body of the shell. The surface is covered with very fine, radial striae which gradually increase in size ventrally.

Two specimens of right valves, with similar ornament, including paratype, cat. no. 9436, are probably of this species. This paratype is almost flat and about as long as high. The posterior wing is well demarcated from the body of the shell and bears fine, radial costae. The anterior wing is not preserved. The dorsal part of the body of this valve is covered with even, closely spaced, numerous fine striae, which ventrally increase in strength to fine, flatly rounded costae.

Compared with *Pecten cadwalladerensis* n. sp., this species has better defined wings and finer ornament. It has much finer ornament than *Pecten inaequistriatus* Munster and *Pecten subdextilis* Krumbeck.

Measurements of holotype are: height, 46.0 mm.; length, 40.0 mm.

*Name.* Pontus, bridge; amnis, river.

*Types.* The holotype, cat. no. 9437, is from about 7500 feet north of Tyaughton creek and about 9000 feet north-northwest of the mouth of Camp creek. The paratype, cat. no. 9436, is from about 1100 feet due north of Tyaughton creek at the mouth of Camp creek and at an approximate elevation of 7700 feet.

*Mytilus ? shulapsensis* n. sp.

Plate 2, figures 9, 10

Although the exact generic reference of this species has not been determined, it is described because of its possible stratigraphic

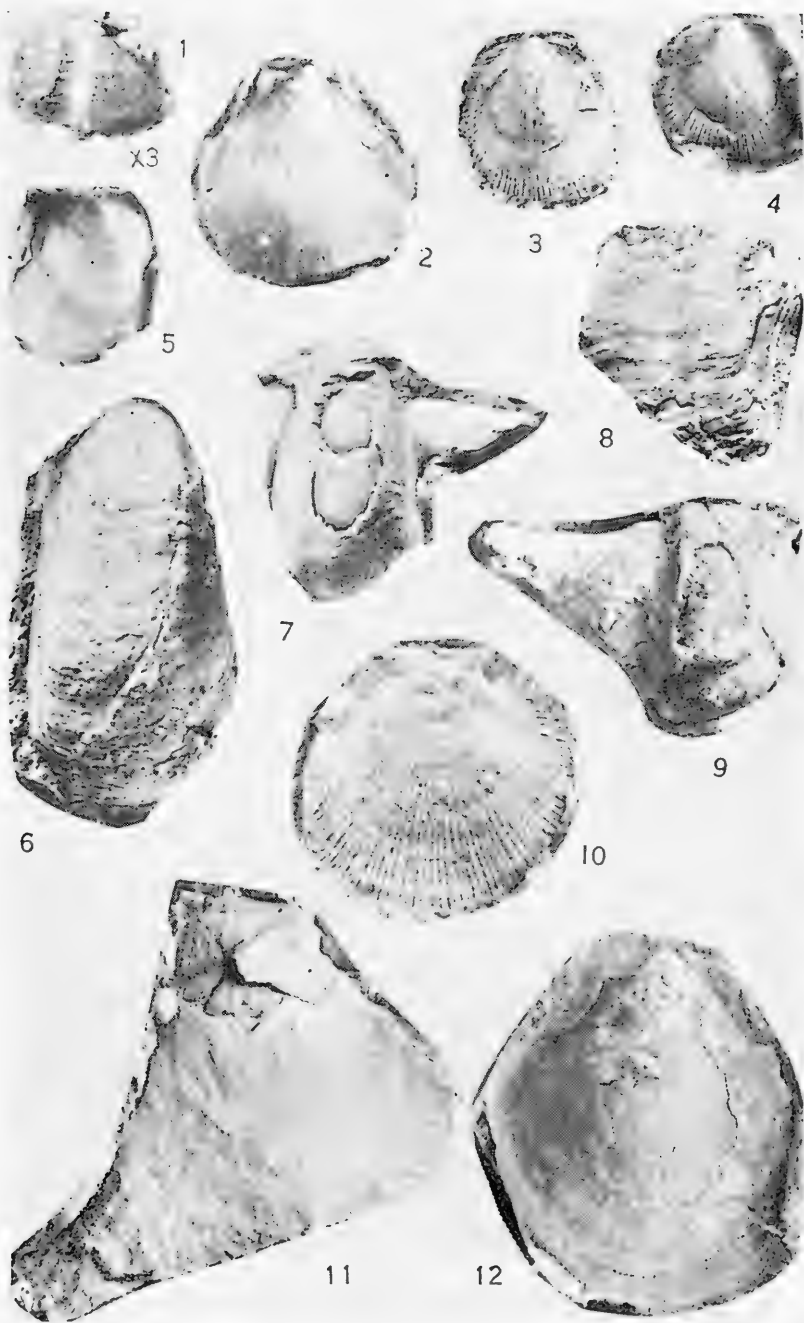


PLATE I



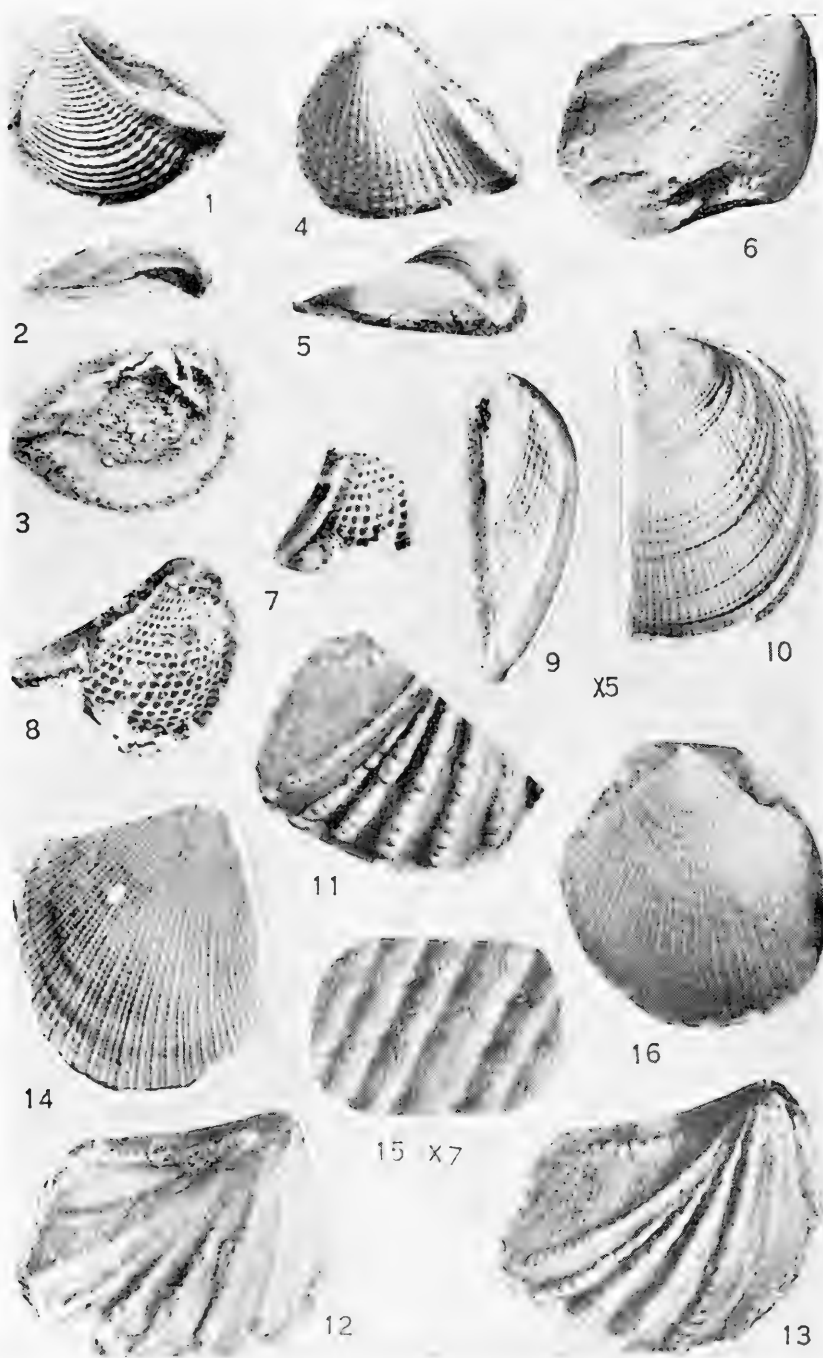


PLATE II



value. For the purpose of description it is oriented as though it were a *Mytilus*.

The outline is somewhat trigonal and higher than long. The dorsal margin is of variable length, the posterior rounded, the ventral short and rounded and the anterior margin nearly straight. The shell is variably, but mostly, moderately convex. Along the anterior border the shell is abruptly incurved and concave and separated from the remainder of the shell by an angular shoulder. In some specimens also the surface is somewhat flattened in a narrow strip along the dorsal margin. The entire surface is ornamented with radial, low, broad costae and concentric fine costae, the latter being most apparent in the spaces between the costae. The meshes between the radial and concentric ornament contain rounded to transverse "punctae". There are also some widely spaced varices of growth.

The surface ornament is finer than that of *Lima subpunctata* d'Orbigny, the outline is more triangular and no wings have been observed in our specimens. There is at least some superficial resemblance to *Mysidia americana* Körner, but the outline is different, the anterior part of the shell is sharply inflected and the details of ornament are different. There is some resemblance to some Jurassic species of the genus *Arcomytilus*.

Measurements of the holotype are: height, 12.2 mm.; length, 7.5 mm.

*Name.* Shulaps, a geographic name.

*Type.* The holotype, cat. no. 9444, is from Tyaughton creek, three-quarters of a mile above Spruce Lake creek.

#### EXPLANATION OF PLATES

*Note.* Except where otherwise stated all illustrations are of approximately natural size. Indicated enlargements are approximate.

#### PLATE I

Figure 1. *Macrodon (Catella?) tyaughtonae* n. sp. Holotype x 3. Geol. Surv. colls., cat. no. 9426.

Figure 2. *Pecten cadwalladerensis* n.sp. Paratype. Geol. Surv. colls., cat. no. 9427.

Figure 3. *Pecten cadwalladerensis* n.sp. Paratype. Reverse of Holotype. Geol. Surv. colls., cat. no. 9428.

Figure 4. *Pecten cadwalladerensis* n. sp. Holoplastotype. Geol. Surv. colls., cat. no. 9429a.

Figure 5. *Cassianella beyrichi* var. *crickmayi* n. var. Paraplastotype. Geol. Surv. colls., cat. no. 9430a. Right valve.

Figure 6. *Cassianella beyrichi* var. *crickmayi* n. var. Holotype. Geol. Surv. colls., cat. no. 9431.

Figure 7. *Cassianella beyrichi* var. *crickmayi* n. var. Paratype. Geol. Surv. colls., cat. no. 9432. Posterior wing of left valve.

Figure 8. *Cassianella beyrichi* var. *crickmayi* n. var. Paratype. Geol. Surv. colls., cat. no. 9433.

Figure 9. *Cassianella beyrichi* var. *crickmayi* n. var. Paratype. Geol. Surv. colls., cat. no. 9434. Anterior wing of left valve.

Figure 10. *Pecten cadwalladerensis* n. sp. Figured specimen. Geol. Surv. colls., cat. no. 9435. Inferred right valve.

Figure 11. *Pecten pontiamnis* n. sp. Paratype. Geol. Surv. colls., cat. no. 9436. Inferred right valve.

Figure 12. *Pecten pontiamnis* n. sp. Holotype. Geol. Surv. colls., cat. no. 9437.

#### PLATE II

Figure 1. *Myophoria adornata* n. sp. Holoplastotype. Geol. Surv. colls., cat. no. 9438a. Side view.

Figure 2. *Myophoria adornata* n. sp. Same specimen. Dorsal view.

Figure 3. *Myophoria adornata* n. sp. Paraplastotype. Geol. Surv. colls., cat. no. 9439a. Interior left valve.

Figure 4. *Myophoria cairnesi* n. sp. Holoplastotype. Geol. Surv. colls., cat. no. 9440a. Side view.

Figure 5. *Myophoria cairnesi* n. sp. Same specimen. Dorsal view.

Figure 6. *Myophoria zeballos* n. sp. Paratype. Geol. Surv. colls., cat. no. 9441.

Figure 7. *Myophoria zeballos* n. sp. Second caste of holotype, shows part of keel broken off in the holoplastotype. Owing to fragility of the holotype, it is difficult to obtain good casts of it.

Figure 8. *Myophoria zeballos* n. sp. Holoplastotype. Geol. Surv. colls., cat. no. 9442a.

Figure 9. *Mytilus? shulapsensis* n. sp. Holotype x 5. Geol. Surv. colls., cat. no. 9444. Anterior view.

Figure 10. *Mytilus? shulapsensis* n. sp. Same specimen x 5. Side view.

Figure 11. *Myophoria columbiana* n. sp. Second impression of holotype showing a better cast of the tubercles than the holoplastotype.

Figure 12. *Myophoria columbiana* n.sp. Paratype. Geol. Surv. colls., cat. no. 9445. Mold of interior of right valve.

Figure 13. *Myophoria columbiana* n. sp. Holoplastotype. Geol. Surv. colls., cat. no. 9443a.

Figure 14. *Pecten tyaughtonae* n. sp. Paratype. Geol. Surv. colls., cat. no. 9447.

Figure 15. *Pecten tyaughtonae* n. sp. Paratype. Geol. Surv. colls., cat. no. 9446. Enlargement x 7 of part of surface ornament. Shows diagonal surface striation between the ribs.

Figure 16. *Pecten tyaughtonae* n. sp. Holoplastotype. Geol. Surv. colls., cat. no. 9448a.

## NOTES ON THE WILLOWS OF SASKATCHEWAN

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THE WILLOWS, though very common in Saskatchewan, have received little attention until recently. This may be due partly to the difficulty of collecting, and partly to the unsatisfactory treatment in the manuals dealing with the flora of this area and hence difficulty in classifying them. Two excellent papers on the willows of Canada by Ball (*Canadian Field-Naturalist* 7: 145-152, 171-175) have been published, but these deal with only a few sections of the genus. There has been marked activity in the collection and field study of the willows of Saskatchewan recently, and a few notes and brief descriptions may aid amateur collectors in gaining an acquaintance with these interesting shrubs. These collections were made in the southern half of the province and did not extend into the northern, unsettled areas farther than about the 54th parallel.

The collectors co-operated in the exchange of specimens and notes, and this added to the interest and the amount of information obtained. It also resulted in the accumulation of a representative collection from this area in the herbarium of the University of Saskatchewan. Those who contributed collections and information were the following:—A. J. Breitung from the north-eastern part of the area, R. C. Russell from the central part, and J. L. Bolton of the Swift Current Experiment Station from the southern part. G. F. Ledingham assisted the author in collecting and classifying many of the collections. Grateful acknowledgment is made of this assistance and also of collections made at Fort Saskatchewan, Alberta, and vicinity with notes from Dr. G. H. Turner. Special acknowledgment must be made of many and excellent specimens and field notes received from Mr. Breitung. These were collected at McKague and the districts in the vicinity and eastward to Hudson Bay Junction and northward to Tisdale and Nipawin. The collections on which this study was based are in the herbarium of the University of Saskatchewan.

Raup (*Jour. Arn. Arbor.* 17: 1936) made extensive collections in the Athabaska Lake region and northward. The eastern and larger part of this lake lies in Saskatchewan and those species reported by him from the area in this province are included. None of these collections were seen by the writer.

C. R. Ball examined duplicates of the collections and determined difficult specimens. The author wishes to acknowledge this generous and most valuable aid.

*Salix amygdaloides* Anders. PEACH-LEAVED WILLOW.

The range of this willow is given by Ball (*Can. Field-Naturalist* 40: 151, 1926) as a narrow strip in southern Quebec and Ontario and a second narrow strip in the extreme

southern portions of Manitoba, Saskatchewan and Alberta. Recent collections in Saskatchewan have extended the range farther northward. The following collections were made: Maple Creek and Swift Current Creek near Stewart Valley (Bolton), Riverhurst (R. Parliament), Bertwell and Hudson Bay Junction (Breitung). The collections by Breitung are far north of its usual range. It was found by the writer to be very well developed at Maple Creek and to extend for a few miles along a small stream. It was also observed growing vigorously along a small brook at Medicine Hat, Alberta. Bolton also reports it from Eastbend and Val Marie.

This willow usually grows along alluvial stream banks. Under favourable conditions it is a large tree, the trunk reaching a foot or more in diameter. The branchlets are very slender, yellowish and usually drooping. The leaves are ovate-lanceolate, acuminate, finely serrulate, light green above, paler and usually glaucous beneath, glabrous except when young. The large size, the drooping branches with light green foliage give this tree a very characteristic appearance.

A collection of May 13, 1938, made at Maple Creek by Bolton, and a collection made at Bertwell by Breitung on June 1, 1941, show the staminate aments shedding pollen.

*Salix arbusculoides* Anders. SHRUBBY WILLOW

This is a northern species ranging, according to the manuals, from Alaska and northern Alberta to Hudson Bay. The only collections made in Saskatchewan in our area were in the Prince Albert National Park. It was observed chiefly along the highway from mile 10 to Montreal Lake. It is most common in swampy areas at Waskesiu. Here the shrubs were slender, erect, usually 10 to 15 feet in height. Only a few shrubs were found on dry ground where they were low and shrubby in appearance with broader leaves. Rydberg gives the height as less than one metre, which evidently refers to shrubs growing under unfavourable conditions. Dr. Turner reports it along river banks in Alberta at Edmonton and Fort Saskatchewan. It is reported as common in the Athabaska Lake region (in Saskatchewan) and as far north as Great Slave Lake by Raup. Collections from Yellowknife Bay, Great Slave Lake, made by Dr. H. R. McIntyre, are in the University herbarium.

The shining, dark brown, erect branches, the narrow, serrulate leaves with dark green shining upper surface, silvery-silky beneath, with rather short, appressed hairs, and the slender, elongate pistillate aments will aid in identifying this species. The staminate aments were shedding pollen on May 24 at Waskesiu and on June 3 at Yellowknife Bay, Great Slave Lake.

Schneider (*Jour. Arnold Arboretum* 2: 85, 1920) assigns *S. saskatchewanensis* v. Seeman, which Rydberg in his manual lists as a species, to *S. arbusculoides* var. *glabra* Anders. but is doubtful if even the variety is justified.

*Salix Bebbiana* Sarg. (*S. rostrata* Richardson). GREY WILLOW.

This species (including the variety *perrostrata*) is the most common and widespread willow on the prairies. It extends to the northern part of the province and beyond as far north at least as Great Bear Lake. In the northern part of the area surveyed the species seems to predominate, on the prairies the variety is more common. It is found in low places, river banks, borders of sloughs and lakes, sometimes on low prairies forming extensive stands, and on high and dry ground in districts where the rainfall is considerable. Usually a shrub but in favourable situations may become a small tree. The gray bark, elliptical, oblong or obovate silky pubescent leaves and the elongate loose aments with hairy capsules and yellowish bracts will help to identify the species. The staminate aments begin to shed pollen about the second week in May and the pistillate to ripen the first weeks in June. In the northern part of the area the pubescence on the leaves is sometimes very dense, giving the shrubs a gray appearance.

*Salix Bebbiana* var. *perrostrata* Schneid. ( *S. perrostrata* Rydb.)

This variety differs from the species chiefly by its less pubescent leaves which become glabrate in age. Rydberg regards this variety as a distinct species, but there are so many intermediate forms that this separation is not justified. It is doubtful if even the separation of the variety is of any real value.

*Salix brachycarpa* Nutt. SHORT-CAPSULED WILLOW.

This is a wide-ranging species in Canada, extending from Hudson Bay to northern Alberta. In our area it was found growing in moist alkaline open or semi-open places, as the borders of sloughs or the bottoms of dried-out sloughs. It was not collected in swamps or bogs.

It is a low shrub about one to two feet high, easily recognized by its dense, gray, villous pubescence on leaves, aments, and branchlets. The aments are short and in the mature pistillate approach spherical. It is one of the later flowering species and very irregular in its time of flowering. The staminate aments usually begin to open about the last of May and develop for some time. The pistillate mature slowly and irregularly during July and August. They are sometimes found still attached to the plant the following spring.

The following collections from Saskatchewan are in the University herbarium: Saskatoon, Naicam, Vonda (Russell), Spy Hill (John Macoun as *S. desertorum*), Crooked River (Breitung). Breitung reports it as

common from Muenster to Watson and north to Naicam.

According to Raup the species is very variable to the north. Two varieties have been established by him.

*Salix brachycarpa* Nutt. var. *psammophila* Raup (see *Jour. Arnold Arbor.* 17: 230, 1936).

This variety differs from *brachycarpa* chiefly by the strictly erect habit and the broad, ovate leaves. It was described from collections made in the dune area south of Lake Athabaska, Saskatchewan. (see *Rhodora* 33: 241, 1931).

The other, var. *antimonia* (Schn.) Raup, a subarctic variety less pubescent than the species, was described from collections made at Upper Slave River, N.W.T. and Churchill, Manitoba. It has not been reported from Saskatchewan.

*Salix candida* Fluegge. HOARY WILLOW.

The Hoary Willow is common in swamps and bogs in the northern part of the area surveyed. It is less common in the southern. In Canada it ranges from Quebec to the western mountains and north to Great Slave Lake. It is an erect shrub usually two to four feet in height but may reach a height of 8-10 feet where conditions are very favourable. The branchlets are densely white tomentose. The linear leaves are also densely white tomentose beneath, green and rugose above with scant tomentum. The hoary appearance and its leaf characters make it easily recognized. Hybrids are common.

The flowers appear rather early but are irregular in the time of appearance. The anthers and styles have a reddish or purplish color when young. Collections of mature staminate aments were made at Saskatoon on April 29, but usually they mature early in May.

The forms with glabrescent leaves or glabrous when mature have been placed in the variety *denudata* Anders. Hybrids are common.

*Salix discolor* Muhl. PUSSY WILLOW.

This willow is common in most places, such as the margins of sloughs, ponds and river banks, from the Atlantic to the Rocky Mountains. It was found throughout the area surveyed but was not common in the Prince Albert National Park or northward to Montreal Lake. It is a shrub, or under favourable conditions a small tree. The leaves are usually oblong-elliptic, serrate to entire, bright shining green above and glaucous beneath. The stipules are often large and cordate. The aments are large and conspicuous, the scales dark, almost black, with long, silky hairs. The staminate usually mature toward the end of April. The mature pistillate have large, beaked pubescent capsules usually rather loosely arranged.

Several varieties have been described but botanists are not agreed on their taxonomic value. One may be mentioned:

*Salix discolor* var. *prinoides* (Pursh) Anders. (*S. prinoides* Pursh of Rydberg's Manuals) with narrower and more serrulate leaves and narrower catkins.

*Salix exigua* Nutt. SLENDER WILLOW.

A low, shrubby willow common in the mountain slopes of British Columbia and extending into southern Alberta and Saskatchewan. It resembles *S. interior pedicellata* (Anders.) Ball and has been confused with it, but the leaves are usually shorter and more pubescent, giving the shrub a silvery appearance.

Specimens collected in southwestern Saskatchewan at Swift Current by J. L. Bolton have been assigned to a variety of this species, *Salix exigua* var. *luteosericea* (Rydb.) Schn. Its pubescence is more villous and the aments more loosely flowered than the species. No collections have been made by the writer.

*Salix glauca* L. NORTHERN WILLOW.

Students of the willows are not agreed on what should be included in *S. glauca*, or indeed whether typical *glauca* exists in North America. Schneider (*Bot. Gaz.* 66: 325. 1918) reviews the different opinions. Raup (*Rhodor* 33: 241. 1931) in a recent paper states that collections made by him in the Athabaska-Great Slave Lake region are identical with European specimens of *S. glauca* L. in the Gray herbarium. He also assigns collections made in the Athabaska Lake region in Saskatchewan to this species and its variety *acutifolia* Schn. (see *Jour. Arn. Arbor.* 17: 232. 1936).

*Salix glauca* var. *glabrescens* Schn.

Collections of a willow found to be rather common in the swamps of the northern part of our area are placed under this name, until critical study by taxonomists determines the true position and relationship of this and other similar willows in the northern part of western Canada. These collections were made chiefly at Prince Albert, in the National Park north of it, and by Breitung at McKague and vicinity. Similar specimens collected near Edmonton were received from Dr. Turner. These seem to belong to the group of willows that grow abundantly in many areas of the Jasper National Park, Alberta, and extend northward through the Canadian Arctic regions. This group has passed under various names. Schneider (*Bot. Gaz.* 66: 326. 1918) is inclined to regard these willows as varieties of *Salix glauca* L. He remarks on the "variability in the shape and size of the leaves in the amount of pubescence and in the length of the aments". He, however, establishes two varieties, *acutiloba* and *glabrescens*. Polunin (*Nat. Mus. Can.* No. 92: 162. 1940) emphasizes the variability of similar collections from the Canadian eastern Arctic. He states, "There being no wholly satisfactory classification of the various forms and possible subspecies I am with one exception (*S. glauca* L. var. *acutiloba* Schn.) grouping them all together under the collective name given above" (*Salix glauca* L.). As these collections from

the northern part of our area are closely related to the specimens labelled var. *glabrescens* by Schneider, they are assigned here for the present.

This willow is a low shrub usually one to three feet high, with gray-hairy branches. The leaves vary in shape but are often obovate or elliptic, more or less silky-pubescent above and becoming glabrous below, whitish or glaucous beneath; the aments are on leafy peduncles, and the amount of pubescence on the leaves, twigs and capsules is very variable. The grayish appearance, and the deep green of the leaves above and whitish beneath, will help to separate it from *S. pedicellaris* and *S. myrtillofolia*, with which it is often associated. The staminate catkins usually mature in our area the last week in May or the first in June.

*Salix humilis* Marsh. Low WILLOW.

Collections of a willow made in 1941 at Nipawin and McKague by Breitung on sandy pineland are assigned to this species. There seems to be no previous record of the occurrence of this willow in Saskatchewan. Its range in Canada is given in the manuals as from Newfoundland to Ontario.

It is a low shrub about 2-8 feet high. The branchlets are more or less densely tomentose or pilose. The leaves are usually oblanceolate or oblong, glabrescent above, densely whitish or grayish tomentose beneath with prominent veins, the margin wavy and slightly revolute. On vigorous shoots the leaves sometimes resemble those of *Salix discolor*. The aments are borne on slender elongated branchlets, short, 2-4 cm., sessile, appearing before the leaves; the pubescent capsules are long-beaked with a distinct stipe, the bractlets dark, hairy.

*Salix interior* Rowlee (*S. longifolia* Muhl.)  
SANDBAR WILLOW

The Sandbar Willow extends from Quebec to Alberta and southward into the United States and northward to Great Slave Lake. It is common in Saskatchewan on sandbars along river shores and moist, sandy soil along roadsides. It can be easily recognized by its usual habit of forming thickets rather than clumps. The stem is slender and usually erect with grey bark. Under very favourable conditions it may become a slender tree. The narrow, linear leaves, pubescent when young, are also good field characters. The aments are irregular in maturing. The staminate usually shed their pollen in late May or early June.

*Salix interior pedicellata* (Anders.) Ball. (*S. linearifolia* Rydb.)

Narrow-leaved forms under 5 mm. wide are usually placed in this variety. Rydberg in his manual places them in the species *S. linearifolia* Rydb. The characters he uses in separating them are so variable in our material that this is not justified. It seems doubtful if even the separation of a variety is of value. Collections made at Hudson Bay Junction and Nipawin by Breitung, and at Saskatoon, resembled *Salix interior* var. *Wheeleri* Rowlee

(*S. Wheeleri* (Rowlee) Rydb.) in the densely silvery-silky villous leaves broader than in the species. Observations made at Saskatoon indicated that this was due to injury to the shrubs by the attacks of Chrysomelid beetles or their larvae.

*Salix lasiandra* Benth. RED WILLOW

This willow ranges through British Columbia, eastward into Saskatchewan and southward into the United States. It is rare in Saskatchewan. It was collected at Langham on the shore of the North Saskatchewan River and along small brooks near Waskesiu Lake in the Prince Albert National Park. Only two large shrubs, both staminate, were located at Langham, but at Waskesiu a number of large vigorous shrubs were found both staminate and pistillate. It was also collected at Nipawin by Breitung.

This willow is found chiefly along the banks of streams. It is a shrub or small tree with smooth, yellowish or dark, brittle twigs and branches. The leaves are large, lanceolate to broadly lanceolate acuminate at the apex, finely glandular-serrulate, dark shining green above and usually glaucous beneath; the staminate aments thick, somewhat conical in outline at first but become elongate. The pistillate are large, usually reaching a length of 2½ inches. The elongate pistillate aments and the acuminate leaves usually glaucous underneath will help to separate this species from *S. serissima* Fern. and *S. lucida* Muhl. Mature staminate catkins were collected on May 24 at Langham and on May 30 at Waskesiu. No previous reports of the occurrence of this species in Saskatchewan have been found.

Collections made at Waskesiu and Nipawin belong to the variety *lanceifolia* (Huds.) Bebb. It differs from the species in its more pubescent branchlets.

*Salix lucida* Muhl. SHINING WILLOW

Ball (*Can. Field-Nat.* 40: 149. 1926) gives the range of this species in Canada as from Labrador to Central Manitoba, but expresses doubt if the western limits of its range have been found. He also points out that the reports of its occurrence in western Canada were probably due to confusion with other species.

Collections of the species and varieties were made by Breitung in 1940 and 1941 in the region of Hudson Bay Junction and westward to McKague and northward to Nipawin on the Saskatchewan River. Duplicates of these collections have been received from Breitung and leave no doubt that *Salix lucida* occurs in this region. Field observations have not been made by the writer but Breitung reports it as a shrub about 6-15 ft. in height, growing chiefly along streams.

It is a shrub or small tree with yellowish-brown or dark brown shining branchlets, the leaves ovate-lanceolate to lanceolate, green and glossy but somewhat paler beneath, finely serrulate with glandular tipped teeth, the glands also present on the petiole at the base of the blade and on the stipules; the aments are large and on leafy peduncles, the cap-

sules are glabrous, the bractlets pubescent. Collections made at Bertwell and Hudson Bay Junction on July 1, 1941, show the staminate aments shedding pollen.

*Salix lucida* var. *angustifolia* Anders.

The leaves are more elongate-lanceolate than in the species. Specimens from Leacross, Bertwell, Hudson Bay Junction and McKague have been assigned to this variety.

*Salix lucida* var. *intonsa* Fern.

Collections from Greenbush, Hudson Bay Junction, Prairie River and Nipawin have been assigned to this variety. It differs from the species in having the branchlets of the first year and the under-surfaces of the leaves permanently pubescent with shining or brownish hairs.

*Salix lutea* Nutt. YELLOW WILLOW

The range of this willow in Canada is not clearly defined. It is usually given as from Manitoba to Alberta. Raup reports it as common northward to the Slave and Peace rivers. It is rather common along streams and the margins of lakes in the area surveyed, and probably throughout the province where the conditions are favourable. It is an erect shrub with gray bark, and smooth, light yellow branchlets. The leaves are lanceolate, more or less acuminate, serrulate to entire yellowish green and shining above and glaucous beneath. The glabrous capsules are occasionally brown in color. The staminate aments usually mature from the 10th to the 20th of May.

*Salix MacCalliana* Rowlee. MACCALLA'S WILLOW

This is a common species in low ground along streams and the borders of swamps in the northern part of the area surveyed. Its range is usually given as from Manitoba to Alberta. Raup reports it as common in parts of the Wood Buffalo Park in Northern Alberta.

It is usually a shrub, sometimes reaching 12 feet in height, with dark, reddish-brown bark. The leaves are thick, dark green above and lighter beneath, glandular serrulate. The pistillate aments appear with the leaves and are conspicuous by reason of its large size and whitish, hairy capsules and bracts. The staminate aments mature about the first week in June. A handsome and striking shrub, especially when in bloom and when the pistillate aments are mature.

*Salix myrtilifolia* Anders. BLUEBERRY WILLOW

A northern species found across Canada from Labrador to Yukon. It is common in bogs and swamps in the northern part of our area. In these situations it is usually a low, depressed shrub a foot or two in height, sometimes very low and carpet-like. In the firmer ground around swamps it sometimes becomes an erect shrub six feet or more in height. It was rarely observed south of Prince Albert. It is reported by Bolton from the Cypress Hills.

The leaves vary in shape and texture, being usually elliptic to oblanceolate in shape, crenate-serrulate, green on both sides and with short petioles. The branchlets are dark brown, villous at base. The capsules are glabrous. The staminate aments usually mature the last two weeks in May or early in June. A collection made at McKague by Breitung has been assigned to the variety *brachypoda* Fern. The leaves are whitish beneath in this variety.

*Salix pedicellaris* var. *hypoglauca* Fern. BOG WILLOW

This is a wide-ranging willow extending across Canada from Quebec to British Columbia, and as far north as Athabaska Lake in Saskatchewan according to Raup. It was found to be rather common in swamps and bogs in the northern part of the area examined. The most southern collection was made at Macdowall, about 70 miles north of Saskatoon. It extends northward to Montreal Lake as far as surveyed.

It is a low shrub, usually about 2 to 3 feet high. The leaves are usually oblong, obtuse and rather firm, green above and whitish beneath. The aments are on leafy peduncles. The glabrous capsules when maturing are usually more or less purplish in color. The staminate aments usually mature the last week in May or early in June.

Fernald (*Rhodora* 11: 161. 1909) separated western material as the variety *hypoglauca*. The leaves are glaucous beneath, while in the species they are green. Rydberg does not recognize the variety in his manuals.

*Salix pellita* Anders. SATINY WILLOW

The range of this willow in Canada is given in most of the manuals as from Newfoundland to Manitoba. Rydberg includes Saskatchewan and Alberta in its range, but no other reports of its occurrence in these provinces have been found. It grows along streams at Tisdale and as far west as Star City, but was not observed further west. Collections made at McKague and Wallwort, which lie south of Tisdale, were received from A. J. Breitung.

Rydberg describes it as a low shrub, but observations made in this area showed that it is usually a large shrub up to 15 feet in height. It can be easily distinguished by its lanceolate or linear-lanceolate leaves, green and rugose above and densely white, silky-villous below. The leaves resemble somewhat those of *Salix candida*, but the silky-villous pubescence beneath easily separates them from this species. The pistillate aments at the time of dehiscence are conspicuous even at a distance from their white appearance. The branchlets are dark in color, but are usually covered with a whitish bloom. They are brittle according to Breitung's observations. Collections made on April 30th and in early May by Breitung show mature staminate aments.

Collections of a willow with somewhat broader leaves and with short, sparse silky hairs beneath were made by Breitung at

McKague, Wallwort and westward to Hudson Bay Junction and north to Nipawin. These collections are provisionally assigned to this species till further and more complete collections are obtained. They possibly belong to *S. subcoerulea* Piper.

*Salix petiolaris* Smith. BASKET WILLOW

This is the most common willow in the plains area of Saskatchewan excepting *Salix Bebbiana* and its variety *perrostrata*. It is less common in the semi-wooded areas northward. Its range in Canada is from Newfoundland to Alberta. It grows around swamps, sloughs and in moist areas. It is usually a rather low shrub with many slender, erect stems, but under especially favourable conditions may reach a height of ten feet or more.

It can usually be recognized by its slender, erect stems with reddish or yellowish bark and its narrow, lanceolate, serrulate leaves glaucous beneath and silky when young. The aments are conspicuous at the time of flowering as they are produced in abundance along the upper part of the stems, the staminate being usually bright yellow in color, though sometimes reddish. The mature pistillate aments vary in length and thickness. The staminate usually mature during the first two weeks in May.

It is a variable species varying in the pubescence and shape of the leaves. The aments also vary in shape. Schneider (*Jour. Arn. Arb.* 2: 19. 1920) described the following variety:

*Salix petiolaris* var. *rosmarinoides* Schn. (*S. gracilis* Anders.)

It differs according to Schneider from the species chiefly by the narrower and more or less linear-lanceolate or lanceolate often somewhat acuminate leaves. The under-surface of the leaves is always glabrous or almost so except the very youngest leaves, while the upper surface is more or less hairy. The aments are somewhat shorter and thicker and more dense than in the species. Many of our collections belong to this variety.

*Salix planifolia* Pursh. FLAT-LEAVED WILLOW

This willow is common in swamps and low ground along streams in the area examined. Its range in Canada is from Labrador to Alberta and north to Great Slave Lake. It is a shrub usually about ten feet in height. The branchlets are dark reddish-brown and shining. The leaves are usually ovate and entire though sometimes indistinctly toothed, shining green above, glaucous beneath and silky when very young, but soon glabrous. The pistillate catkins are large, dense and white silky pilose in appearance. Well-developed ones resemble somewhat the young catkins of *Salix discolor*, but they can be distinguished by the smaller, denser appearance due to more closely arranged capsules. They are also smaller and have shorter beaks. It is one of the early-flowering willows. The staminate aments mature in late April or early May.



*Salix planifolia* var. *Nelsonii* Ball (*S. Nelsonii* Ball)

Specimens of this variety were collected by Breitung at McKague. It differs from the species by its narrow, pointed leaves.

*Salix pseudomonticola* Ball. FALSE MOUNTAIN WILLOW

The range of this willow in Canada is given by Ball (*Illus. Flora of the Pacific States*, Vol. I, 497) as British Columbia and the Rocky Mountains. In Saskatchewan it is common in swamps and low moist ground extending as far east as McKague and northward to the Prince Albert National Park. No specimens have been obtained from the more southern part of our area. Raup reports it from the Wood Buffalo Park in Northern Alberta. It is a shrub reaching about ten feet in height. The branchlets are yellow or brown. The leaves are large, usually elliptic-ovate, rounded to cordate at the base, glandular crenate-serrate, green above and glaucous beneath, glabrous on both sides and veins prominent. The aments are conspicuous as they are large and often curved and purplish in color and nearly sessile. The capsules are glabrous, the bractlets conspicuously hairy.

It is one of the earliest flowering of the willows in the vicinity of Saskatoon. The staminate aments usually mature late in April or early in May.

*Salix pyrifolia* Anders. (*S. balsamifera* (Hook.) Barratt). BALSAM WILLOW

The range of this willow in Canada is from Newfoundland to Alberta. Collections were made only in the northern part of the area surveyed. It was found at Lake Waskesiu and Crooked River in swamps and margins of pools. It appeared to be very local in its distribution, though it seems to be more common in the northeastern part of our area, since Breitung reported it from Bjorkdale and Golburn and as locally abundant at Orley, about 25 miles east of Tisdale. Specimens collected at Fort Saskatchewan, Alberta, were also received from Dr. Turner.

It is a well-defined species of striking appearance. It is a shrub usually six to ten feet or more in height. The leaves have long petioles, usually ovate to ovate-lanceolate, rounded or cordate at the base, dark green and somewhat rugose above, glaucous and reticulate below. They have a soft texture and are said to have an odor of balsam when expanding. The mature pistillate aments are usually very conspicuous. They are large and closely arranged in a raceme up to 18 inches in length and often dark brown or purplish in color. The capsules are glabrous on long pedicels, with yellow or brown bractlets clothed with whitish silky hairs. The staminate aments mature the last week of May or early in June.

*Salix serissima* Fern. AUTUMN WILLOW

The range of this willow in Canada is from Newfoundland to Alberta and northward. Specimens from the Athabaska Lake region are provisionally assigned to this species by

Raup. Collections were made in Saskatchewan from Pike Lake near Saskatoon to Montreal Lake, and east to McKague. It is rather common in this area in swampy land and borders of lakes.

It is usually an erect shrub or small tree reaching a height of about fifteen feet. The leaves are dark shining green above and lighter beneath, usually ovate-lanceolate, acute or acuminate, thick and firm, the margin finely glandular serrate. The aments are large and conspicuous, often brownish in color, on leafy stalks. The large capsules are glabrous and shining. It is the latest flowering willow in this area, the staminate aments usually maturing in June, the pistillate not usually dehiscing till August. They remain attached during the winter.

*Salix Scouleriana* Barratt. SCULER'S WILLOW

The range of this willow is given by Ball (*Illus. Flora of the Pacific States*) as from southern Alaska to New Mexico. Macoun reports in from British Columbia.

It was collected at Lake Waskesiu in 1938, and later was found to occur in the Prince Albert National Park along the highway from Halkett Lake to Waskesiu, a distance of 25 miles. While not common, yet it was observed along the highway where the conditions were favourable. It seemed to be most common in damp woods associated with *Populus tremuloides*. It occurred also in drier ground, but there it was more or less stunted and often dwarfed, probably from the cropping of the twigs by deer. It is reported as common about Lake Athabaska by Raup. It resembles in habit of growth *Salix discolor*, but is much more handsome in appearance. It often reaches a height of fifteen feet or more. The leaves vary in shape. They are often ovate to obovate, dark green above and usually white pubescent below, often the pubescence is very dense, rarely rusty in color when young. The branchlets are stout, often densely white-pubescent but sometimes dark and glabrate. The aments are large and very conspicuous, being distantly arranged along the stout branchlets for one or two feet. They are usually pale purplish in color.

The earliest collection was made on May 25th. At this date the pistillate aments were dehiscing. The staminate had almost all fallen away. It was the earliest flowering willow in this area, being further advanced than *pseudomonticola*, *planifolia* or *discolor*.

*Salix silicicola* Raup.

Described by Raup from collections made on sandy beach ridges south of Lake Athabaska (Sask.) He states it is "one of the most common willows of the Mackenzie basin and is made conspicuous against the dark greens of the conifers by its nearly white leaves and twigs".

*Salix Turnorii* Raup. TURNOR'S WILLOW

Raup has described this species from collections made among inland sand dunes south of William Point on the south shore of Lake Athabaska, Saskatchewan.

*Salix Tyrellii* Raup. TYRELL'S WILLOW

Described by Raup from collections also made in the inland sand dunes south of William Point on the south shore of Lake Athabasca, Saskatchewan.

The following introduced willows planted as ornamentals were collected:—*Salix pentandra* L., Laurel-leaved Willow, easily recognized by its glandular-denticulate leaves, which are dark shining green above; *Salix daphnoides* Vill., with large densely silky-villous pistillate aments appearing in April; *Salix fragilis* L., Crack Willow, with yellowish twigs readily breaking away at the base; *Salix alba* L., White Willow, which somewhat resembles *S. fragilis* but the twigs are not brittle, and hybrids of the two last named. None of these were observed to be established.

Collections of a number of hybrids of the native willows were also made but these have not been studied.

## EXCLUDED SPECIES

*Salix argyrocarpa* Anders.

Rydberg in his manuals lists the range of this species from Saskatchewan (doubtfully) and Mackenzie. The evidence available at present indicates that it is confined to the east.

*Salix cordata* Muhl.

Reports of this species from Western Canada in Macoun's *Catalogue of Canadian Plants* and some of the manuals are probably due to confusion with *Salix lutea* and other species. Schneider (*Jour. Arn. Arbor.* 2: 189) states: "This willow, as far as I know, does not occur in the West." Collections made in 1940 of twigs with leaves at Tisdale, McKague and Hudson Bay Junction closely resemble those of *S. cordata* but further and complete collections are required before definite assignment can be made.

*Salix curtiflora* Anders.

Schneider (*Jour. Arnold Arbor.* 2: 194,

1921) does not consider this species distinct from *S. myrtillofolia*.

*Salix desertorum* Richards.

Botanists are not agreed on the status of this species. Raup (*Jour. Arn. Arbor.* 17: 231, 1936) states that in his opinion "it may be only a dwarfed form of the woodland *S. glauca* growing in bleak, exposed situations or cold upland bogs."

*Salix erythrocoma* Barratt.

Schneider (*Jour. Arnold Arbor.* 1: 14, 1919) does not regard it as a good species.

*Salix gracilis* Anders.

This is a synonym of *S. petiolaris rosmarioides* Schn. (See Schneider: *Jour. Arnold Arbor.* 2: 19, 1920).

*Salix Hookerana* Barratt.

A Pacific Coast species. There is no good evidence to support the view that it is present in this province though reported from Saskatchewan by Rydberg.

*Salix Mackenzieana* Barratt.

This willow resembles *S. lutea*, from which it is usually separated by the long pedicels of the capsules and the brown to dark brown branchlets. Specimens collected along the Saskatchewan River near Langham and elsewhere had pedicels up to 4½ mm. This and the color of the branchlets seem from our observations to be variable characters, and these collections are assigned for the present to *S. lutea*.

*Salix pseudocordata* Anders.

It is difficult to decide from the literature available just what is included in this species. Collections made at McKague by Breitung seem identical with specimens from the Rocky Mountains under this label, but further and complete collections are needed before definite assignment of them can be made.

*Salix saskatchewanana* v. Seem.

According to Schneider (*Jour. Arnold Arbor.* 2: 87, 1920) this is nothing but *S. arbusculoides* or the variety *glabra* Anders.

## THE OCCURRENCE OF THE DOLLY VARDEN CHAR IN SALT WATER OFF BRITISH COLUMBIA

By J. R. DYMOND

Director, Royal Ontario Museum of Zoology, Toronto

THE DOLLY VARDEN char occurs in the fresh waters of Alaska, British Columbia, Washington, Oregon, and California. Southward it is restricted to waters at considerable elevation but northward it occurs at lower altitudes and in many places enters the sea. However, there appears to be little published information as to how far south the species occurs as a marine fish. In an effort to throw light on the sea-going habits of the Dolly Varden, a questionnaire was distributed to various persons having knowledge of this matter in the western United States and Canada. The information secured in this way is summarized below. In addition to

the persons here mentioned, I am indebted for assistance in compiling this information to Dr. W. A. Clemens and Dr. R. E. Foerster, past and present directors of the Pacific Biological Station and to Major J. A. Motherwell, Chief Supervisor of Fisheries for British Columbia.

Even in the days of S. F. Baird the downstream limit of the Dolly Varden (in California) was the region of the confluence of the Sacramento and Pitt rivers, a very considerable distance from the sea.—LEO SHAPOVALOV, *Natural History Museum, Stanford University*.

In state of Washington found abundantly



only in lakes, generally mountain lakes and swift-flowing, cool streams, generally in the mountains; abundant and huge in Lake Chehalis.—W. M. CHAPMAN, *Washington State Fisheries Laboratory*.

In Puget Sound it is taken from salt water in large numbers . . . reaching a weight of 11 pounds or more.—JORDAN AND STARKS, 1896.\*

To his knowledge no Dolly Vardens have ever been taken in the Sooke salmon traps at the south end of Vancouver Island.—MR. GOODRICH, *Manager of Sooke Harbour Fishing and Packing Company*.

One Dolly Varden taken in Sooke salmon traps within five miles of Sooke Harbour about 4 years ago weighed about 1½ pounds.—J. C. SCOTT, *Fisheries Inspector, Victoria, B.C.*

In 20 years' experience never knew of a Dolly Varden to be taken in the tidal estuary at outlet of Kennedy Lake, west coast, Vancouver Island.—W. P. FORSYTHE, *Fisheries Inspector, Kamloops, B.C.*

Dolly Vardens are caught in salmon seining operations in Stuart channel in the vicinity of the mouth of Chemainus River.—A. N. MCKINNON, *Fisheries Inspector, Ladysmith, B.C.*

In Howe Sound, Dolly Varden concentrate in large numbers in the tidal reaches of the main Squamish River during the eulachon run in April and May and are then much fished for by anglers. They are not taken very far away from the mouth of the river by trollers or gill netters.—F. J. WINLOW, *Fisheries Inspector, Squamish, B.C.*

Have seen Dolly Vardens caught where the Squamish River enters Howe Sound.—JOHN HAZELDINE.

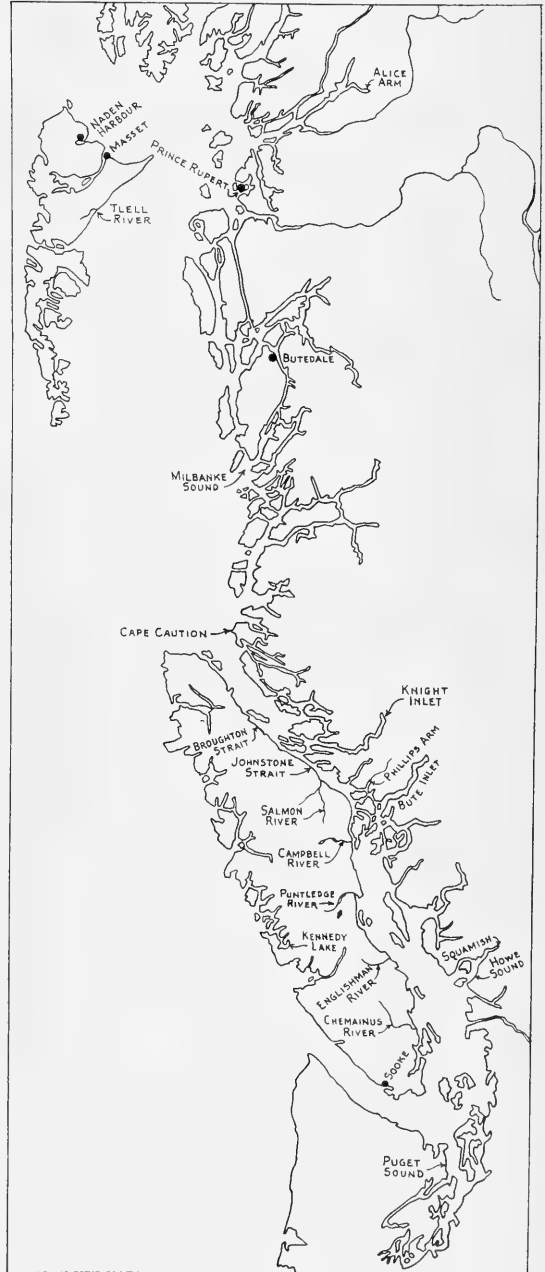
Off mouths of most of rivers on east coast of Vancouver Island from Campbell River in the north to Englishman's River in the south. Most of the streams within this area rise in more or less extensive lake systems but, due to the nature of the terrain through which they flow, sea-run fish can ascend them for only a short distance. There is a population of Dolly Vardens which live and spawn within the lake systems and another or sea-run population which, while spawning in that portion of the streams available to them, spend most of their lives within tidal waters. Occasionally caught at mouth of Campbell river in tidal water. A Dolly Varden occasionally caught at mouth in Courtenay Slough, a tidal water portion of Puntledge River. During early spring a definite run of Dolly Varden appears off the mouth of Englishman's River but does not ascend beyond tidal water. The runs of Dolly Varden in the lower reaches of these rivers are insignificant and of no consequence.—ALEX. MACDONALD, *Fisheries Inspector, Courtenay, B.C.*

Many silvery specimens caught in a pool a short distance above tide-water in a stream near the head of Bute Inlet; 12-pound specimens reported, 7 lbs. largest caught.—Con-

stable C. N. MCALPINE of *Provincial Police*, through R. L. HAIG-BROWN.

In Orford Bay, Bute Inlet; Phillips Arm and Johnstone Straits (Salmon River).—A. F. LLOYD, *Duncan, B.C.*

A school of Dolly Varden appears off the mouth of Philipps River, mainland of British Columbia, in early spring but does not ascend beyond tidal waters.—ALEX. MACDONALD, *Fisheries Inspector, Courtenay, B.C.*



Sketch map of British Columbia coast showing localities at which Dolly Varden char occurs.

\* The Fishes of Puget Sound. *Proc. Calif. Acad. Sci.* 2nd ser. 5: 785-854.

Dolly Varden are seen at the mouth of Campbell, Salmon and Philipps rivers every spring.—S. BOOND, *Inspector of Fisheries, Quathiaski Cove, B.C.*

Dolly Vardens occur in Broughton Strait and Alice Arm.—D. S. CAMERON, *Alert Bay, B.C.*

Great numbers of Dolly Vardens seen around the piles of the cannery at Glendale Cove in Knight Inlet.—R. L. HAIG-BROWN, *Campbell River, B.C.*

Dolly Varden believed to occur in the sea off mouths of nearly all coastal streams from Cape Caution northward to Milbanke Sound.—I. URSETH, *Fisheries Inspector, Bella Coola, B.C.*

Dolly Varden have been taken by hook

and line from the wharves at Massett and Butedale.—G. E. MOORE, *Fisheries Inspector, Prince Rupert, B.C.*

Dolly Vardens are caught off the wharves at Massett and Nalen harbours (Queen Charlotte Islands). They appear in tidal waters at mouth of Tlell River in March and April in very poor condition and appear again in tidal waters in June and July, at which time they are bright and in very good condition.—E. S. RICHARDSON, *Fisheries Inspector, Tlell, B.C.*

From the above information, it would appear that the Dolly Varden commonly enters the sea from 50°N. latitude northward, but that south of this point its occurrence in salt or brackish water is not common and occurs only under special and peculiar circumstances.

## MISCELLANEOUS CONTRIBUTIONS FROM THE NATIONAL HERBARIUM OF CANADA, III

By A. E. PORSILD

*National Museum of Canada, Ottawa*

**Sparganium glomeratum** Laest.—The first North American recording of *S. glomeratum* was from the north shore of the Gulf of St. Lawrence, Quebec<sup>1</sup>. Recently it has been reported also from Minnesota<sup>2</sup>. Fruiting specimens of what is actually the first North American collection of this species, with other Yukon plants, have recently come to light in an unnamed collection of plants made by the late Dr. Malte. Dawson: August 10, 1916, *M. O. Malte*, No. 82 (Can.).

**Mibora minima** (L.) Desv.—In the National Herbarium are two sheets of this tiny European grass, collected near the Experimental Farm, Sidney, Vancouver Island, B.C., March 1 and August 6, 1914, *John Macoun* (Can. Nos. 88,367 and 91,549).

The first and possibly only North American record of this species appears to be from Plymouth, Mass., (*Rhodora* 17:97 (1915)).

The species is a native of the Mediterranean area, and doubtless was introduced at Sidney. The species and genus both are previously unrecorded from Canada and from the Pacific coast.

**Eriophorum opacum** (Björnstr.) Fern. var. *cinnamomeum* n. var.

*Culmi solitarii vel pauci aggregati; antherae 2.0 mm. longae; lana palli-cinnamomea.*

Culms solitary or few together, anthers 2.0 mm. long; bristles pale cinnamon brown.

This apparently undescribed variety of *Eriophorum opacum* with pale cinnamon-brown bristles was collected near Ottawa, Ontario, in the Mer Bleue peat bog near Carlsbad Springs, May 29, 1938. Type: A. E. Porsild, No. 6430 (Can.).

The variety flowers about two weeks later than the common Cotton Grass (*Eriophorum spissum*) with which it was associated. From *E. spissum* Fern. var. *erubescens* (Fern.) Fern., our plant is readily distinguished by its few or solitary culms and by its narrowly ovoid spikes that, except for the colour of the bristles, are typical of *E. opacum*.

**Carex elynoides** Holm.—In a sheet of *Carex nardina* Fr., Waterton Lake, Alberta, July 31, 1895, *John Macoun*, No. 10,762 (Can.) is a single specimen of *C. elynoides* Holm. Mackenzie, in *North American Flora*, gives no Canadian stations and the species as far as the writer is aware is new to the flora of Canada.

**Dryas Drummondii** Richards var. *tomentosa* (Farr) n. comb.; *Dr. tomentosa* Farr, Ott. Nat. 20: 110 (1906).

Rydberg (Fl. Rocky Mts.), in his key distinguishes *Dr. tomentosa* from *Dr. Drummondii* by: "Hypanthium and calyx densely white-tomentose, not glandular" as opposed to "Hypanthium and calyx densely hairy with black glandular hairs, only slightly tomentose"; in the text the leaves of *Dr. tomentosa* are said to be "tomentose on both sides, grayish-green above, white beneath".

Farr, l.c., however, distinctly says: "The sepals are densely glandular with purplish black stalked glands", remarking further that she found it growing in patches with *Dr. Drummondii* with which it did not seem to intergrade but preserved its own individuality".

With the more abundant material now available the writer is unable to detect any consistent difference, except in the tomentose upper leaf-surface, setting *Dr. tomentosa* apart from *Dr. Drummondii*. Since analogous

<sup>1</sup> H. F. Lewis, in Can. Field-Naturalist 45: 178 (1931).

<sup>2</sup> O. Lakela, in Rhodora, 43: 83-85 (1941).

tomentose variants occur in both *Dr. integrifolia* and *Dr. octopetala*, and since moreover "*Dr. tomentosa*" has the same range and distribution as *Dr. Drummondii*, it would seem best to consider it a variety of the latter.

The following stations should be added to the known range of *Dr. Drummondii* var. *tomentosa*:

MACKENZIE RIVER: Bear Rock near Norman, No. 3388; GREAT BEAR LAKE: Bear R., Mt. Charles, No. 3332 and McTavish Arm, Hunter Bay, No. 5308 (all A. E. & R. T. Porsild, Can.); ALASKA: Head of Chitina R., 2000' elev. H. M. Laing, Nos 118 and 119 (Can); Cape Vancouver, J. M. Macoun, No. 19,941 (Can.).

## THE BUCKEYE BUTTERFLY (*JUNONIA COENIA* HUBN.) IN ONTARIO

By L. H. BEAMER

**D**URING the past two years a number of specimens of a small, strikingly colored butterfly, *Junonia coenia*, commonly called the "buckeye" and considered of rare occurrence, in Ontario, have been taken in the vicinity of Thornbury, Ont. The first specimens were seen on September 21, 1940, and the numbers present at that time suggested to the writer that there was a breeding population in this area. Hence a close watch was kept in the summer of 1941.

The area observed was a narrow belt of shore-land bordering on Georgian Bay, stretching eastward from the town of Thornbury a distance of four miles. The land is just a few inches above the lake level. It is usually moist, and often very wet in places. The soil is of clay but is thickly strewn with glacial boulders on which the butterflies would come to rest at the end of their short flights. The habitat agrees with that given by Scudder (*Butterflies of the Eastern United States and Canada*, Cambridge, 1889).

The most conspicuous flowering plants are species of *Lobelia*, *Gerardia*, *Gentiana crinita*, and *Parnassia* sp. Scudder (op. cit.) gives *Gerardia purpurea* as the food plant of *J. coenia*, in addition to such plants as *Plantago* and *Ludwigia*. Hence, both the ecological and food requirements of *J. coenia* are present in the area considered.

During the summer of 1941 the following specimens were seen or taken by the author:

July 31; 2 taken, four miles east of Thornbury: August 6; 15 seen, three taken, five miles east of Thornbury: August 13; 20 seen, 1 taken, five miles east of Thornbury: August 13; 1 seen, one mile east of Thornbury: August 17; 25 seen, 3 taken, one mile east of Thornbury: September 1; 24 taken, one mile east of Thornbury: September 7; 53 seen, 3 taken, eastern edge of Thornbury: September 21; unrecorded number seen, 2 taken, three to five miles east of Thornbury: October 5; a few individuals seen in the drier areas three miles east of Thornbury; most of the territory was soggy with recent rains and water from the lake, which was at a higher level than during the summer.

According to Scudder (op. cit.), *Junonia coenia* "seems to belong to the *Carolinian*

fauna, but it occupies also the southern third of the Alleghanian, where it is found in some abundance as far as the annual isotherm of 55°, or even 50°, if not further. Southward it extends to the very extremity of Florida (Maynard) and is found sparingly in Cuba. . . ." Scudder records it from Chatham, Stratford and Port Stanley in the western peninsula of Ontario.

Specimens in the collection of the Royal Ontario Museum of Zoology have been taken at Toronto; Dr. Urquhart informs me that he saw a specimen at Highland Creek and another at Fisherman's Island (Toronto) during the summer of 1940; also that Mr. Patterson of London, Ont., had taken 15 specimens in that locality.

From the above evidence, the writer is led to the conclusion that *Junonia coenia* is a resident butterfly in parts of the western peninsula of Ontario.

To Dr. F. A. Urquhart of the Royal Ontario Museum, I wish to express my sincere appreciation for his help in the preparation of this article. Dr. Urquhart examined all of the specimens captured, and contributed valuable data without which the article could not have been written.

Previous reports of the capture of *J. coenia* Hbn. in Ontario have been recorded in the older issues of the *Annual Report of the Ontario Entomological Society*. These might be included as a matter of interest and summarized as follows: 1901; 102, Orillia, (Grant): 1905; 24, Counties bordering on Lake Erie, (Bethune): 1906; 17, Orillia, (Grant): 1906; 92, Ontario, (Gibson and Fletcher): 1908; 10, "rather plentiful," Orillia, (Grant): 1908; 103, "butterfly has become a permanent resident," Orillia, (Grant): op. cit., Toronto (Miss F. Hahn): 1911; 92, London, Sept. 24, (Morden): op. cit., Sudbury, Ontario, (Haight): 1913; 32, "Carolinian Zone," (Walker): 1925; 94, Naswaaksis, N.B., (W. Kasson).—T. N. FREEMAN.

Dr. Harold A. Senn, Associate Botanist, Dominion Department of Agriculture, has now taken over the editorship of *The Canadian Field-Naturalist*. Dr. A. W. A. Brown resigned this position, having accepted a commission as lieutenant on special work in the Canadian Army.

## HARLAN INGERSOLL SMITH

1872 - 1940

THE bare outline of the life of Harlan I. Smith is to be found in *Who's Who in America* and other such standard books of reference, but that gives you no idea at all of the man himself. No one who knew him well can ever forget him.

It was October, 1923, and a blazing sun. I was grubbing in the black, dry dust of a shell-head near Esquimalt, and finding but few specimens, for West Coast middens are poor pickings, when I heard a friendly voice call, "Hello, are you interested in dead Indians, too?" I glanced up to see a tall, bearded figure scrambling nimbly down towards me at the bottom of the slope. "What luck are you having?" "Not much, I'm afraid," and I pointed to the few specimens I had laid aside, "but I started only half an hour ago." "And what's the matter with this one?" he asked, as he stooped to pick up a nicely chipped point which lay at my very feet, and slipped it into his pocket. It was this chance meeting with "Harlan I." that marked the beginning of a close and greatly cherished association which continued until his death in 1940.

Picking up arrowheads, as well as less familiar evidences of aboriginal life, had been at first a hobby and later his profession. In boyhood, near Saginaw, he had made a collection of Indian artifacts in stone and pottery, and acquired a knowledge of the archaeology of the Saginaw Valley. While he was still only a boy, aged nineteen, he discovered that archaeology could be more than a hobby, and plunged headlong into scientific work.

In the next three years, 1891-1893, he led a life of ceaseless, of almost incredible, activity, for he was, during this period: an assistant at the Peabody Museum in Harvard; a student at the University of Michigan; in charge of the anthropological collections in the museum there; and he had charge of the anthropological exhibits at the World's Fair in Chicago. In the same period he managed to get in three field-trips: in 1891, with Professor Putnam on the Madisonville Village Site in Ohio; in 1892, at other sites in Ohio; and in 1893, he investigated mounds near Madison, Wisconsin!

A position with the American Museum of Natural History followed, in 1895, and here he remained till 1911, when he came to Ottawa as archaeologist for the Dominion Government, a post which he retained till his retirement in 1937.

But a settled position did not mean a lapse into inactivity. In New York, as in Ottawa, he turned constantly from one phase of archaeological research to another: he was a lecturer on the New York Board of Education; he gave a course of lectures on the evolution of industries at the Pratt Institute in Brooklyn; he published comprehensive reports of his

excavations in the United States; and served as archaeologist on the Jesup Expedition (1897-1902). He organized the winter lectures for school children at the National Museum of Canada, a series which, thirty or more years later, is still continuing, with a growing attendance; he was the first on the museum staff, and one of the first in America, to use the moving picture camera for recording the present-day life of the Indians, principally in British Columbia and the western prairies.

In the 1920's he turned his attention to restoring the totem-poles which, threatened by decay, were on the verge of disappearing for ever; he wrote, during the War of 1914-18, of the activities of a museum in wartime, and showed how vitally it could assist the national effort to victory. Imagine, if you can, his feelings to-day, could he know that the museum to which he gave the greater part of his life was closed!

Another aspect of anthropology to which he gave much time was the compilation of a series of aboriginal designs, in the hope that they would be used by manufacturers of Canadian products, and would serve also as a stimulus and source of inspiration for native arts and crafts, for his interests were not confined to the "dead" Indians over whose extinguished fires we first met, as will be seen by his detailed studies of the life and environment of the Bella Coolas, and only slightly less complete notes on the Carriers and some of the Chilcotin groups.

The outstanding monument to his industry is the "Archaeological File": eleven four-drawer filing-cases overflowing with detailed information on the archaeology of Canada, the most complete file of its kind. In it are to be found the basic data for any phase of the archaeology of Canada, for any district, for any type of artifact.

His enthusiasm for work was boundless; even when no longer a young man, he would carry heavy loads of plaster of Paris on his back for miles through the dense forests of the British Columbia coast to make moulds of petroglyphs, secretly doubting the while that they would ever be used, but determined that they should not go unrecorded. For "recording the facts" was another of his great enthusiasms, and he made the most detailed record of all specimens, all photographs, all observations. Perhaps only one characteristic was as strong as his enthusiasm, and that was his boundless impatience with red tape and its incredible stupidities; his anecdotes concerning thick-headed bureaucrats were many—and pungent!

But no man is immortal, though his work well may be. All who knew him regret his passing, but they know that he laid firm the foundation of his science in a new land; that is a task that the gods grant to but few, and not all of these accomplish it.—D. L.

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## CONTENTS

	Page
The Collecting of Marine Zoological Material in British Columbia Waters. By C. McLean Fraser .....	115
Bernard Rogan Ross to Spencer Fullerton Baird .....	120
<i>Larus kumlieni</i> and its Allies. By A. L. Rand .....	123
The Indian as Conservationist. By C. H. D. Clarke .....	127
Notes on Some Fish of the Eastern Canadian Arctic. By T. H. Manning .....	128
Hackberry in the Ottawa District. By H. Groh .....	130
The Summer Birds of the Madsen Area, Patricia District, Ontario. By E. V. Goodwill .....	131
Precision with which Speckled Trout ( <i>Salvelinus fontinalis</i> ) Return to the Same Spawning Grounds. By V. D. Vladykov .....	134
Notes and Observations:—	
Say's Phoebe ( <i>Sayornis saya saya</i> ) at Great Bear Lake. By A. E. Porsild .....	122
Banding Provides Age Record for Atlantic Murre. By T. S. Hennessy .....	122
Hybrid Flicker at Chatham, Ontario. By A. A. Wood .....	122
Status of the Philadelphia Vireo at Winnipeg. By R. D. Harris .....	122
Cold Storage as an Aid to the Busy Ornithologist. By A. A. Wood .....	137
The Flammulated Screech Owl at Kamloops. By M. Y. Williams and G. J. Spencer .....	138
Green Heron on Mississippi River, Lanark County, Ontario. By E. G. Ross .....	138
Suckers and Bull-heads. By L. T. S. Norris-Elye .....	139
Some Additions to the Vertebrate Fauna of Darlington Township, Durham County Ontario. By A. E. Allin .....	140
Index to Volume LVI .....	141

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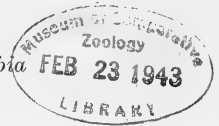
Nos. 8 AND 9

## THE COLLECTING OF MARINE ZOOLOGICAL MATERIAL IN BRITISH COLUMBIA WATERS

35,343

By C. McLEAN FRASER

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IT IS NOT necessary to emphasize the fact that marine animals vary as much in the nature of their habitat as terrestrial animals do. It is necessary, therefore, to know something of the habitat of an animal or a species before any success in collecting it can be expected. Since, however, there are numerous associations of marine forms, just as there are of land forms, some general information may soon be obtained in any area as to what type or types of animals or associations of animals may be obtained. There are many barren spots or extended areas such as the comparatively smooth rock exposed to the full force of the Pacific surf, where living organisms are scarce or absent altogether; just as there are many fertile spots not so numerous, not so extensive, where a great variety of species flourishes. Some observations as to suitable locations and methods of collecting may not be out of place.

Dealing only with animals or colonies of animals that may be detected with the unaided eye, the subject may be treated under three headings—shore and shallow water collecting; surface and subsurface collecting; bottom collecting. Although these intergrade, the characteristics, in the main are distinct.

### SHORE COLLECTING

Shore collecting applies to all animals that inhabit the area between the extremes of high and low water at spring tides, as well as such as live near enough to the low tide mark to be readily obtained by wading when the tide is fully out.

As it has been already indicated, only a comparatively small portion of the 25,000 miles of tide water line in British Columbia is well suited for animal habitation. If the rocky shore is perpendicular or steep and is at all subject to a heavy surf, sessile forms find too much difficulty in making the attachment, except in the case of the rocks, sandstone, shale, and slate, that become eroded enough to give an uneven surface for such attachment. On the open exposed coast even such persistent forms as barnacles and mussels are excluded. Even in inside shallow waters it is only on these easily eroded rocks that life flourishes at all well. Where barnacles and mussels can become established, certain other forms are sure to appear. The almost ubiquitous starfish *Pisaster ochraceus* can thrive and the other widely distributed species, *Pycnopodia helianthoides*, may follow

on, but will not get so far above low water. Small polychaetes and various small crustacea find shelter and may appear in abundance in areas not pre-empted by barnacles, mussels, etc. There may appear other associations, such as the anemone-serpulid association, or masses of a single species, e.g. the brachiopod, *Terebratalia transversa*, or the phoronid, *Phoronis pacifica*, and freely moving forms, mainly crustacean, e.g. the isopod, *Ligyda pallasii*, may wander about over the surface. In the case of sandstone in particular, the portion of the rocky shore at low tide or between low tide and half tide may be worn away to a much greater extent and may even form caves of greater or lesser magnitude, where a much greater protection is given and where, therefore, life is more abundant.

Very often collecting from such rocky shores can be done only from a row boat. In protected waters this can often be worked satisfactorily by one alone. When the rocks are exposed to any very definite swell or surf it is a difficult, if not dangerous, job for one to undertake the collecting alone. With one familiar with handling a boat under such conditions and one to collect, it is often possible to get very fine specimens that are seldom found in other locations.

As the rocks become less steep and approach the horizontal, except where the incline in exposed locations is such that the surf rolls up with great force, conditions tend to become more suitable for habitation and other species appear in the picture, particularly again on sandstone and other readily eroded rocks. Such molluscs as the limpets, *Acmaea* spp., the key hole limpet, *Diadora aspera*, chitons of various species, nudibranchs, especially members of the family Doridae, crabs and other crustacea and more delicate forms as polyzoa, hydroids, etc., appear as well. Still greater variety is obtained when tide pools hold water from the time the tide leaves the place on the ebb, until it reaches it again on the flood. When pot holes are formed in the sandstone excellent aquaria are provided. These pot holes initiated possibly by the rolling around of a pebble, are enlarged by the wear of sea-urchin spines, sometimes by boring molluscs and always by the wash of the waves until they may become large enough to shelter even as large an animal as an octopus. For collecting in tidepools and potholes a dip net is essential. In general, an even,

rocky surface covered with living *Fucus* is a very poor place to look for animal life.

In general, there is comparatively little life above a quarter tide, i.e. one-fourth of the distance from extreme low to extreme high at the best spring tides, and, of course, there is still less above half tide. There may be a few barnacles, mussels, periwinkles, etc., that can stand extensive change in conditions, but most species cannot stand the long spell out of water. Naturally, in all cases there must be a fair supply of food available, and as most of these species found on the rocks are attached, or at least, sedentary, they thrive best where there is extensive interchange of water carrying the food supply. These conditions obtain where the water washes through narrow passages, as it does in so many places along the coast where there is such a multitude of islands, separated in some places by wide channels but in others by narrow straits.

Very often a reef exposed at half tide or less is a good collecting spot. Special care is necessary in moving about in such a place. The wet rocks are usually very slippery and the living kelp spread over them makes the condition much worse, since, except in sheltered bays, the water is generally quite cold. Gumboots are rather necessary for wading about in shallow water, but these boots have little grip on wet rocks. Hob-nailed boots take better hold here, but everything slips with the slippery kelp. It is good policy to progress slowly, using the feet as tactile organs and putting little weight down until a certain amount of security is assured.

At times, along the shore, the rock in place is not continuous and beaches appear. Beaches may consist mainly of mud, fine or coarse sand, gravel, shingle, etc., a more or less continuous layer of separate stones, or rocks with boulders, or these may to some considerable extent intergrade. A purely muddy beach does not harbour very many animals. They are so few that for general collecting the beach is unsatisfactory, although it may be the only habitat for certain polychaetes and molluscs. When the mud is firmer and is associated with sand or gravel, the story may be quite different. The population may still consist, in the main, of molluscs and polychaetes, but there is a much greater variety of these and crustacea appear as well, e.g. such sand shrimps as *Upogebia pugetensis* and *Callinassa californiensis*, fine specimens of the large *Nereis*, of *Arenicola* and several other of the tubicolous worms. *Saxidomus*, *Paphia*, *Schizothaerus*, *Mya* and other bivalves of importance make their home here, and leave evidence by a hole or by a cast at the surface.

Digging for these beach dwellers with shovel or fork must be done with care as it is so easy to damage most of them, and specimens in pieces are not desirable for any collection. When an animal is obtained, it is always advisable to put it in a jar or bucket immediately, as some of these burrow so quickly that they may be out of sight on short notice.

In sand beaches, if the sand is shifting, it is not likely that there will be much life. If the sand is firmer and more continually in place, several species may make their home in it. Bivalve molluscs, as *Macoma secta*, polychaetes as *Mesochaetopterus*, phoronids, as *Phoronopsis vancouverensis*, usually give some evidence of their presence. The moon-shell, *Polynices lewisii* comes up in May or June, on such a beach to lay those sand collars, that have aroused the curiosity of more observers than almost anything else on the beach. If the beach is very gently sloping or almost level, there may be multitudes of sand dollars, *Echinarachnias*. On such a beach at or below the lowest tides, eel grass may appear in large patches. At certain times in the summer, usually in June or July, these patches all along the coast are favourite haunts for *Gonionemus vertens*. These may be discovered by moving the eel grass to expose grass-free areas where these medusae pulsate to the surface, turn over and gradually settle with their tentacles fully extended. Sometimes other medusae are found here as well. In the spring and early summer, in some localities, the eel grass may be covered with myriads of the nudibranch, *Melibe gloeina* coming here to mate and then to lay the ribbon-like masses of eggs, (they may attach to *Fucus* or other sea weed as well). Other nudibranchs congregate here, the pretty little aeolid, *Hermisenda crassicornis*, for instance, for the same purpose as do the pteropods, e.g. *Haminoea vesicula* and some of the small gastropods, e.g. *Calliostoma costatum*.

In pure gravel beaches the gravel rolls too much to make life readily bearable, gravel held together with mud or sand is quite suitable, but reference has already been made to such a beach. Sometimes, where bivalves are abundant, broken shell becomes mixed with the sand, gravel or mud and this makes the conditions more favourable. There is much variety in shingly beaches. If the stones are embedded in sand, gravel, or mud, particularly if they are not in contact with one another, there is little life observable. If, on the other hand, the rocks are arranged in loose contact with one another, but in only one or two irregular layers, conditions are very favourable, especially so if the beach is contiguous to a channel or passage through which there is a continuous interchange of water. There may be little superficial evidence that life is abundant there, for it is only as the stones are turned over that most of the animals become visible. Since these stones are often partly covered with small barnacles or other animals with hard, rough shells, an iron bar, such as a nail puller or small crowbar, is a very useful tool to have along. Unless the stones turn over freely, the size, of course, being taken into consideration, the conditions are not suitable and the effort of turning them may be wasted. If the stones are in several layers, it gives too much chance for the water to drain away when the tide is out and the rocks become too dry. In other words, the rocks or stones must be arranged loosely enough that there may be a ready interchange

of water among them to bring in a good supply, but not so loosely that the surfaces dry out too much when the tide is out. Their position in reference to the tide is just as important or, perhaps, more important than the position on muddy, sandy or gravelly beaches. In such a favourable shingly beach life may be very abundant and in great variety. As many as a hundred species have been obtained in a short stretch of such beach at one low tide and sixty or seventy species are very commonly found. These species spread through the whole animal kingdom, sponges, hydroids, anemones, solitary corals, turbellarians, nemerteans, shell fish, brittle stars, sea urchins, holothurians, polyzoa, brachiopods, polychaetes, gephyreans, barnacles, cumacea; great variety of decapods, isopods, amphipods, chitons, numerous pelecypods, shelled gastropods, nudibranchs, ascidians and fish.

Sometimes solitary boulders on a flat shingly beach serve to add variety, but when boulders appear by themselves, they are seldom very extensively inhabited. On shingly beaches, the same care in moving about must be taken as on rocky shores. It is not readily convenient, while shore collecting, to carry about very many containers, hence, although it seems to be very desirable to keep the specimens well sorted, such is quite out of the question. Perhaps the best arrangement is to have one bucket for large specimens of various kinds, and another to carry jars and bottles of different sizes as well as some vials, so that those animals easily damaged may be kept from the others and so that quite small specimens may not be lost among the larger ones. Since it is necessary to keep all specimens in fresh sea water until they are preserved, the water itself serves as considerable protection, and there is not much danger of serious damage if the delicate specimens are not put in with those with rough, hard surfaces. As it is seldom possible to do much satisfactory collecting more than about one hour before low tide and half an hour after it, unless the tide is extremely low, the crowding of the specimens—that can scarcely be avoided if collecting is good—is not for a long period, if they are sorted out as soon as possible after the return to the laboratory or to the place that is temporarily used as such.

If they are not, there is almost sure to be a loss, for some animals die and begin to disintegrate very soon, the crustacea, as a class, being especially prone to do so.

Another type of collecting, viz. collecting from piles and floats, is so similar to shore collecting that it may be included with it. On the margins and under surface of floats there is little change of conditions during the changes of tide and in that respect they differ from the shore, but on the piles they may be affected by the rise and fall of the tide, just as those on the shore. It is seldom that they are exposed to the direct sunlight and that may make a material difference. Unless the piles are well inshore collecting, of course, must be done from a boat.

If untreated piles are not fouled by organic or inorganic waste, and if they are placed where there is free movement of the seawater, they may become quite a treasure house of plant and animal life, often with a greater variety than in a similar area on shore. A barnacle-mussel association soon begins to appear on the freshly driven pile, or polyzoa may appear as soon, and then as small algae begin to grow, representatives of many other classes and orders appear. In its early history it may be attacked by the borer *Limnoria* and by the boring mollusc *Bankia*. These two working, the one on the outside of the pile and the other on the inside, destroy the wood in such a way as to make it very suitable for a hold for attached forms and a well protected series of pathways for creeping or crawling species. The population may finally cover as wide a range as that of a good shingle beach but, perhaps, bearing a greater resemblance to that found on a favourable sandstone shore. Barnacles and mussels continue to do well, but the voracious starfish, namely *Pisaster ochraceus*, *Pycnopodia heliothoides* and *Evasterias troschelii* often make serious inroads when the barnacles and mussels have grown to a sufficient size. Anemones, polychaetes of various species, including the tubicolous *Eudistylia*, such crustacea as crabs, shrimps, hermit crabs, isopods and amphipods, molluscs of different classes but especially clinging species like *Acmaea* and some of the nudibranchs, polyzoa of several species, sponges, ascidians, hydroids to a limited extent and even some species of fish that feed on, or hide among, the barnacles and mussels, appear in time. In taking the specimens from the piles, a good tool to use is a dip net in which the portion of the ring opposite the handle is flattened and made concave, heavy enough so that it will form a good scraper, somewhat the shape of the surface of the pile. A sharpened piece of strap iron will also come in handy. In a row boat one may readily carry a fuller assortment of jars and vials so that the specimens can be kept sorted better than when working on the beach.

A float in a suitable position may become an extensive marine aquarium with the inhabitants under voluntary detention, a very suitable situation in which to study the living animal under natural conditions, not materially affected by the rise and fall of the tide. Here is a collection already sorted and assembled, as it is in place twenty-four hours a day there is no necessity of carrying off specimens wholesale at low tide. As most of the species occupying such a location are found elsewhere as well, these should be left undisturbed for the study of life history, etc., that cannot be done readily in other situations, although small portions may be taken from time to time for more detailed examination. Here *Obelia longissima*, the commonest hydroid on the coast, flourishes. It grows rapidly so the changes may be observed as the new hydranths and the gonophores grow out. The medusa buds appear in the gonangia. They may be collected as they escape and the me-

dusa may be retained until the gonads are developed. The ovum, fertilized, provides the planula that settles down to begin a colony anew. One may be fortunate enough to find a colony of the exquisitely pink *Syncoryne mirabilis* with its larger hydranths provided with capitate tentacles, among which the large medusa-buds, unprotected, appear and soon lose their connection to form the deep-bell-shaped medusae (known as *Sarsia mirabilis*) with their characteristically long manubrium. Here the planulae of *Aurelia* settle down as the scyphulae and soon give off the ephyrae that float away, to be readily caught in the plankton. Here the larvae of the sea urchin may settle down to change over to the adult form in miniature. Here the nudibranch or pteropod lays its egg ribbons with the eggs so transparent that the development of the young embryo may be followed readily. Here the spider crab grows up, breaks up an *Obelia* colony into suitable length to swallow, while its neighbour relative plants algae, sponges, hydroids or polyzoa grow over its rostrum, its carapace and possibly even its legs, making a living and growing camouflage, the efficiency of which is hard to equal.

Why go further? When in the laboratory one becomes wearied of the taxonomy, anatomy and what not, of the specimens collected at low tide one may take rest and recreation by spending some time observing the home life of these creatures in the float aquarium.

#### SURFACE AND SUBSURFACE COLLECTING

Much of the pelagic life at or near the surface is microscopic but many macroscopic species spend a portion of their life there. Since the appearance of the most of these pelagic species is seasonal and since each species has its own season, it is difficult to make general statements regarding collection. Some species live the principal portion of the life cycle at or near the surface. The scyphomedusae come in this category. There are two common species, *Aurelia aurita*, a cosmopolitan form, apparently little affected by changes, within limits, of physical and chemical conditions, inhabits inner, sheltered waters as well as the open sea, and *Cyanea capillata* that shuns water of low salinity seldom appears in the inside waters. In suitable locations these may be found throughout the year. At times, in certain places, *Aurelia* appears in such great numbers that "shoals" seems to be the best term to use. In other places, while they may be somewhat plentiful for a portion of the year they may be entirely absent for the rest of the year. Some of the hydromedusae, too, e.g. *Aequorea*, may be observed throughout the year, but many others, possibly where the whole life cycle is passed through in the year, are distinctly seasonal. Ctenophores, such as *Pleurobrachia* and *Bolinopsis*, appear to be seasonal as well. The polychaete, *Tomopteris* is definitely pelagic, but more of them are obtained some distance below the surface in plankton nets. To the chaetognath *Sagitta* this also applies.

Some animals spend but a brief period at the surface. This is the case in those that

come to the surface to spawn, although they live at the bottom for the principal part of their lives. Some of the polychaetes, e.g. the nereids and syllids, do so. In this case the appearance is limited to a short period in the day, differing for different species, e.g. *Odotosyllis phosphorea*, especially studied in Departure Bay, spawns between sunset and dark. Some of the crustacea, e.g. the euphausiids, come to the surface at spawning time also, but apparently they are not so particular as to the time of the day. Other species appear near the surface only when in the larval stages. Most of these stages are small, though, and hence may be considered with the plankton more satisfactorily. The different types frequent different locations. Most of the medusae, for instance, are readily carried backward and forward with the tide. A good place to collect them is at some spot close to the current or often, better still, in still water or back eddies near the main current. If the surface is much rippled, it is difficult to see them. Some species frequent the water in quiet little bays, somewhat farther removed from a main current. Such bays are particularly suitable at times when the tides coming from the two directions meet nearby.

In species that spawn near the surface, the organisms must appear in numbers or the spawning cannot be very effective. In some cases at least they become segregated by swimming with the current or tide in which case the segregation takes place where the currents or tides meet and the species is said to be swarming. When looking for swarming polychaetes it simplifies matters when the period of the day when swarming takes place is known. To go surface collecting a supply of dip nets is necessary, two dip nets, 10 or 12 inches across the mouth, the one supplied with a net of small mesh only and the other supplied with a coarser mesh net and a smaller bag of marquisette. For smaller and more delicate species a much smaller net with the shallow bag of marquisette is more suitable. Fishing for these surface or subsurface forms cannot be done satisfactorily unless the surface is smooth. If there is a ripple, a glass bottomed bucket may be used for observation but unless the specimens are abundant this does not help very much.

#### BOTTOM COLLECTING

Bottom collecting offers a much wider scope than shore or surface collecting, since the area available for exploitation is infinitely greater and gives a wide range, bathymetrically, as well as geographically. On the other hand, except within a very limited range, it is not possible to see the specimens to be collected. In some of the seas of the world, mainly in the tropical regions, collecting for scientific purposes is done in shallow water by making use of the diving helmet or the diving bell, and Beebe, by using a special diving apparatus has gone to a considerable depth, but in British Columbia no systematic collecting has been done in this way. Some means must be employed to collect specimens on the bottom and bring them to the surface, if possible,

undamaged. Many fine specimens are brought up by the various types of gear used by commercial fishermen but few of these are retrieved. Reliance for getting specimens must be placed on efforts put forth especially for that purpose. Use may be made of some types of commercial fishing gear, but more satisfaction accrues from the use of gear specially adapted for such work. Gear used may be considered as of four types, the seine, the trawl, the dredge and the tangle, although there may be many modifications of each of these.

Of the seines used in the province, the drag or shore seine is the only one that normally brings up bottom forms. While the drag seine is very useful for collecting bottom and shallow water fishes, it is of rather limited value for other organisms, since it is operated in shallow water only and the bottom must be reasonably smooth and free from boulders and eel grass or sea weed rolls it up badly. However, since it sweeps quite an extensive area and brings up at times quite fine specimens, its value cannot be despised.

The various types of trawl (the beam trawl is often used for scientific collecting) can be worked at any depth and may be very satisfactory for use. If the bottom is reasonably smooth, it works well but is of little use if it is rocky and rough. It is primarily designed for catching fish of fair size and serves to take up larger forms in general but most of the smaller organisms unless they are attached to rocks or shells, pass through the mesh. If a successful haul is made, the material may be so great in amount that it is difficult to get it sorted before some of it is no longer fit for preservation. For more refined collecting, the dredge is in most general use. There are many types of dredges but essentially it consists of a rectangular iron frame to which a net bag, either permanently closed at the end or made so that it can be closed by gathering and tying. From each end of the rectangle a double iron rod, moving freely in the one plane, extends forward to form a bridle, the two free ends are tied, not too strongly, and a shackle working on a swivel at the end of the cable is fastened to one of the arms. If the dredge catches on a rock, the two arms break apart and the dredge may be hauled up by the one arm attached to the cable. For rough, rocky bottom it is necessary to protect the netting by attaching canvas to each, long side of the rectangular frame, extending backward far enough to cover the extended bag. The lateral margins are loosely laced so that the canvas will not flap over the mouth of the dredge but the distal margins are left free so that the water may readily pass on through. For dredging in sand or gravel and especially in mud, the canvas protection is not needed and is better left off. For deep water a metal or chain net is sometimes substituted for the ordinary net. Such a dredge is efficient even when it is comparatively small, say 2' 6" or 3' in the long diameter of the mouth and hence it can be readily worked from a low-powered launch or whaleboat, even in quite rough bottom,

without danger of loss of gear, for when the engine is turning over slowly, a dredge held up by catching a rock, serves to anchor the boat. If the power is gradually increased the dredge may be freed; if it is not, the clutch is put out of gear and the dredge is hauled up. To let out and haul in the cable, a power winch, with a possibility of change of speed each way, and a worm feed to run it off or on the drum evenly, is necessary. A sorting table on which the contents of the dredge may be dumped, and some room for tubs and buckets, completes the necessary equipment.

The cable forms a good telegraph line. By placing the hand on it, with some experience it is readily possible to tell if the dredge is on the bottom and, when it is, the kind of bottom—mud, sand, rock, etc.—and if the dredge gets caught an immediate notification is given. Such a dredge works along the uneven surface of the bottom and picks up many specimens that a larger piece of gear might miss entirely. Then the amount obtained in any one haul can be sorted readily very soon after it comes out of the water.

A tangle consists of a metal frame with a bridle, to which is attached masses of rather loose cotton waste, ravelled hemp or other rope material. This is dragged along the bottom and many organisms become entangled in its meshes. As it is loose it will reach down into crevices and hollows to pull out specimens that may be missed by other kinds of gear. It is often quite a proposition, though, to get the specimens thus obtained, free from the tangle unharmed. Often the dredge and the tangle are worked together. The tangle works best in collecting rough or irregular specimens such as starfish, brittle stars, crinoids, crustacea, that are on but not partly buried in the surface.

To collect from the bottom successfully it goes without saying that some information about the bottom is necessary, the more the better. Where the area to be worked has been thoroughly sounded and charted, much of this information is readily obtainable. A careful study of the chart is essential, for it gives the same type of information that is needed for shore collecting, the contour, including underwater channels, barriers, etc., the probable direction of currents, the nature of the bottom and these serve much the same purpose in deciding where to dredge for any particular type or association of organisms. Bottom of sticky mud has little life but if the mud is softer it may be inhabited by certain animals. The only mud starfish is *Luidia*. There may be long-rayed brittle stars, some holothurians such as *Molpadia*, echinoids, as *Lovenia* and a greater variety of polychaetes and molluscs. A bottom of pure sand usually has little but molluscs, a gravel bottom likewise, but gravel partly covering a smooth rocky bottom may contain many attached forms such as hydroids and polyzoa. If the gravel is mixed with dead shell (marked "Sh" on the chart) the bottom often has a very rich fauna. The same may be true of a rough rocky bottom, not so much out in the open but rather near

the entrance of a channel through which passes a strong tidal current. If the current is very strong, it may be possible to dredge satisfactorily only at or near slack water, otherwise the dredge can be kept on the bottom with difficulty or the cable may snarl badly.

In few instances is it advisable to make long hauls. If the bottom is rough the dredge soon fills and is no longer working or in a hard bottom where it is much knocked about the specimens may be damaged if the dredge gets too much filled.

## BERNARD ROGAN ROSS TO SPENCER FULLERTON BAIRD

**I**N 1859 Professor S. F. Baird sent Robert Kennicott to the Mackenzie River region to make collections for the Smithsonian Institution. Kennicott did more than that; he inaugurated a period of collecting on the part of officers of the Hudson's Bay Company that resulted in the natural history of the Mackenzie district becoming as well known as that of many populous and accessible regions. An undoubtedly important influence was the fact that Bernard Ross, the Chief Factor in charge of the district for the Hudson's Bay Company, was already interested in natural history, and was apparently a correspondent of Professor Baird. When Ross got a clear idea of what was wanted he unhesitatingly ordered collections to be made by all his officers, with himself bearing all the expenses.

Through the kindness of the United States National Museum we are able to publish all that remains of a letter written to Professor Baird by Ross on November 26, 1859, and received at Washington on April 23, 1860. In it Ross outlines the information he has, and avows his intention of making his collection as complete as possible. It is of double interest because it shows that he was well acquainted with the goose that Kennicott sent out next year, to be named Ross's Goose by Cassin. Ross published four papers in *The Canadian Naturalist and Geologist* in 1861 and 1862, and one in the *Natural History Review* of July, 1862, so that the interest of the present letter is chiefly historical, none of the records being new. The statistics illustrating the now well-known wild-life cycles are missing. Ross forwarded them confidentially and his trust was certainly not violated. However, they or their like, published with the knowledge and consent of the Company, have since served to provide a foundation on which our ideas of cycles has been built, and they are still available. Ross' personal opinions on the cycles are now of more value than the missing statistics.—C. H. D. CLARKE.

Fort Simpson  
McKenzies River  
26 Nov: 1859

Dear Sir:

I must, previous to the departure of our usual winter Express, endeavor to answer, though inadequately, your very kind and interesting letters of the 26 March and 16 April last.

Through the instrumentality of my Officer's and my own exertions, the various wantages for the Smithsonian Institution will be supplied I confidently expect in a few years. The musk ox will be the most difficult to obtain, but time and perseverance will I expect overcome all the obstacles. I have already got a few fossils collected, from the Anderson River—a few specimen's of animals and some Esquimaux curiosities, and manufactures. If things of the latter description would prove acceptable I could furnish a considerable quantity. I have written to the gentlemen in charge of Posts throughout the whole of this and Athabasca Districts to make collections for me, and I trust that what will be amassed previous to the opening of the Navigation will be something of interest. This will be entirely independent of Mr. Kennicott's labours. They will be collected at my expense, and I hope that the Smithsonian Institution will gratify me by accepting them as a gift. The Eggs I will pay particular attention to, though I fear that it will be the work of years to obtain a complete collection.

Fort Simpson is rather unfortunately situated, as regards making a good collection. Its situation, at the junction of the turbid Liards with the McKenzies River, prevents many fish being in the waters. Wild-fowl having no feeding places on the River, or suitable lake to resort to in the vicinity, pass on directly. At a distance from the barren-grounds, none of the animals frequenting that tract of country ever come here: and the mountains are at too great a distance to draw specimens from them. In other things a tolerable variety of species may be got; small birds, hawks, owls, mice, squirrels, wolverines, martens, minks, foxes, (fulv.) Black Bears, Beaver, and Insects are tolerably numerous. Some of the birds, pigeons for instance, coming here as to their north<sup>n</sup> limits— In the Spring— Backs grayling— *Salmo McKenzie*,<sup>1</sup> and whitefish may be caught in small quantities, in a little river falling into the McKenzie opposite the Fort. For this River water-hens,<sup>2</sup> Sawbills and Buffle-headed ducks are not uncommon, while solitary Harlequins are sometimes taken. During the short period of the

<sup>1</sup> Arctic Grayling, *Thymallus signifer*, and Inconnu, *Stenodus mackenzii*.

<sup>2</sup> American Coot.



wild fowl passing a few geese of most kinds—Hock,<sup>3</sup> teal, widgeon, Pintails, Canvass backs, Black ducks,<sup>4</sup> Golden eyes, and other ducks, besides plover of various kinds can be collected. As there is a considerable farm here growing barley and potatoes with tolerable success, this is the best place I have seen for insects, and I made a very considerable collection here one summer for Sir John Richardson— In the bird line, thrushes, black-birds, woodpeckers, pigeons, kingfishers, whistkey Jaks and Ravens are numerous. The Rook<sup>5</sup> does not come north of Big Island, where it is rare. At Fort Resolution they are very numerous. Mice are very plentiful, as also are squirrels— The fur animals inhabiting this tract of country are Foxes, (Red, Cross and Silver) wolves, Wolverines, Bears (Black and Brown) Beaver, Lynx, Martens, Minks, Muskrats, Otters,—Fishers are nearly unknown, though one or two have been taken about Big Island, and at the debouchure of Slave River into Slave Lake they are plentiful. I have caught as many as 10 in a season there with steel traps or gins. Some of them equal in size to an ordinary otter, and, one very old fellow weighed 18 lbs. These animals are very strong and mischievous, often doing as much damage to a line of traps as a wolverine. Their colour varies, with age, from an almost black tint to a rusty grey. For the purpose of your instituting comparisons of the geographical distribution of the fur-bearing animals in this vast District I enclose you a statement of the quantities of the various kinds of peltries received at all the posts throughout this district for the last 10 years, and also the general or total returns of the District for 16. This will give you an idea of their relative numbers far better than I can in writing upon the subject. I wish you to consider the details of this paper as strictly confidential, it is what I would not communicate to any one but a thorough man of Science—the publishing of the details would seriously compromise me: but the inferences of a Scientific nature drawn from it cannot be objected to. Might I turn your attention to the remarkable circle of increase and decrease that each decade exhibits. In nearly all the Furbearing animals this is observable, but particularly so in the Martens. The highest years in the decade 1845-55 being the extremes and the lowest 1849, nearly the central one. Migration is the only reason that I can assign for such a fluctuation in their numbers; but if so where do they go to? We have posts at the most northernmost post that they could subsist at. I have not at hand materials to form an opinion by observing if they increase and decrease simultaneously all over the Territory, both on this and the other

side of the height of land. We never find them dead as we do the hares, which are quite as regular in their periods of appearance and disappearance. The latter in the winter of 1848 I found dead at Dunvegan, Peace River, in their forms, on repeated occasions. Such were evidently diseased there were boils over their bodies, principally on the neck and fore-shoulders, and inside the stomach of some were found species of hairy, foetus looking substances.

It is extremely probable that your supposition, of the birds that penetrate furthest north being the largest, as well as all migratory animals, is a correct one. The more weakly ones will naturally remain along the road;—and the same thing is I think observable respecting fish, regarding the distance that they come up rivers from the Sea. I will with pleasure aid in obtaining a series of Measurements to determine the matter. Of the resident Northern animals being larger I am doubtful.

Your inquiry respecting the *Frontalis*<sup>6</sup> I will endeavour to reply to at a future period, when I have investigated the subject at more leisure and with more scrutiny than I have heretofore done. My experience heretofore has been only that of a Sportsman, though of this kind I have had an ample supply during my 13 years residence in this district and 17 in the country generally. It strikes me that I have seen often birds among the flocks of white-faced Geese, answering to your description. I am also of opinion that an additional species of the *Berniculi Canadensis* will be discovered, of a size intermediate between the large kind and the Hutchins Goose. In the *Hpbs.*<sup>7</sup> or Snow Goose there will be noted probably 3 species, instead of only one as now. The largest kind, which arrives very late in the Season,—in fact only passing Slave Lake when the leaves are formed on the trees—has a reddish yellow head and neck, much like a Swan. Another kind is not quite so large: and the head is either pure white or with very little yellow on it. The third, and rarest species, is in appearance similar to the latter; but is much smaller, being about the size of a large mallard. The first Goose seen at Resolution is generally a solitary, large Canada about the 18 of April. In a few days, or a longer period, according to the advancement of the season, more of his brethren arrive, seldom in large flocks, parties of from 5 to 20 being about the common size. Next the Hutchin's and Albifrons appear in very large bands sometimes containing hundreds, and the two kinds often flying intermixed. The Snow Geese come latest, in immense bands, and the Yellow headed species last, and they are always the fattest, their size approaches that of the large Canada Goose. These re-

3 Suggests the Coc-a-wee, or Old-squaw.

4 Probably scoters.

5 American Crow; in this region the Raven was often called crow and the Crow was called rook or barking crow.

6 Baird had described *Anser frontalis*, now considered a synonym of *Anser albifrons gambeli*, the White-fronted Goose.

7 "Hyperborealis"; Ross' three species are the Snow Goose, *Chen hyperborea*, the Snow Goose with iron-discoloured plumage, and Ross's Goose, *Chen rossii*, which did turn out to be a new species.

marks all apply to full grown Spring birds. To the movements, habits, food, incubation, and size's of waterfowl (gulls excepted) I have paid much attention. For many nights, during the shooting season have I sat watching their motions from my "decoy" hut, made of twigs and grass, and some thousands at least of the different kinds must have been shot by me during my residence, as until lately I have been a keen and successful sportsman, Killing as many as 30 geese, besides ducks, gulls, plover, etc. and Sometimes a crane or Swan also in the same day. The white and red Crane are common at Fort Resolution.<sup>8</sup> Two species of Swans, the Trumpeter and American<sup>9</sup> are plentiful, ducks of all kinds, bittern, gulls, terns, Perlicans, eagles, hawks, owls, mice, shrews, small birds, fish, insects are very numerous, and eggs particularly gulls can be obtained in any quantity. Altogether it is the best place for a general collection of any in this District. It was here that in Spring 1858 I shot a specimen of the *Somateria v nigra*,<sup>10</sup> and which is I think the same that you mention in your letter to me as having been shot at Slave Lake. I forwarded it to a Mr. Murray of Edinbro', but have not as yet received an answer to the note which I sent accompanying it. I am sorry that I had

not been in correspondence with you as you would certainly have got the specimen. Mr. Murray I know nothing of, further than from a circular that was sent through the country, and his omission to acknowledge the receipt of this bird, will be certainly the best way to prevent me from taking the trouble of sending him any more—I scarcely think that I will be able to procure another, it is not a fresh water bird and from its leanness when killed had evidently been driven inland by stress of weather. From the Anderson River, when we get a post established there it may probably be procured, Through the medium of the Coast Esquimaux. A complete series of the aquatic birds of this District will be very interesting, and we must endeavour to procure a complete set, any duplicate of these that you do not happen to require. I would wish to be kept for one in case I should wish after leaving this country to form a collection, and I think I can promise you a general collection of specimens from . . . . .

<sup>8</sup> *Grus americana* and *Grus canadensis*. Whooping Crane and Sandhill Crane. By another equally allowable interpretation the Whooping Crane only may be meant.

<sup>9</sup> Trumpeter Swan and Whistling Swan.

<sup>10</sup> Pacific Eider.

## NOTES AND OBSERVATIONS

SAY'S PHOEBE (*Sayornis saya saya*) AT GREAT BEAR LAKE.—The Say's Phoebe has previously been recorded as ranging northeastward to Great Slave Lake, Fort Simpson and Fort McPherson (Preble, *North American Fauna*, No. 27, p. 393, 1908, and Anderson, in Stefansson, *My Life with the Eskimo*, p. 480, New York, 1913) and the Mackenzie Delta (Porsild *Mss.*). When I was at Great Bear Lake in 1928 I saw several of these birds at the north end of McTavish Bay and took a specimen that is now in the National Museum of Canada.—A. E. PORSILD.

#39-653241, replaced it by #40-656567 and released the bird in good condition.

When not on the wing or incubating, Atlantic Murres spend much of their time roosting on rocks or clambering around ledges and through crevices, during which activities the birds rest or travel on the full length of the tarsi rather than on the toes as do most other species. The bands are consequently subjected to much abrasion through rubbing upon rough rocks and the band numbers and legends may become obliterated after a year or more of service. To maintain continuous records of individuals of this species it is therefore necessary to renew the bands every few years.—T. S. HENNESSY.

BANDING PROVIDES AGE RECORD FOR ATLANTIC MURRE.—In August, 1941, while on the Eastern Island of the St. Mary Islands Bird Sanctuary, Saguenay County, Quebec, I captured and released a banded Atlantic Murre (*Uria aalge*) which had attained the age of at least 11 years. So far as is known, this is the oldest age record available for a banded bird of this species in North America. The complete banding history for this bird is recorded hereunder.

Banded with #B616037 as an adult at least one year old on the Eastern Island by Dr. Harrison F. Lewis on June 30, 1931, and recaptured and released by him on the same island on July 6, 1934. On August 3, 1940, Dr. Lewis again caught this bird on the same island, removed the old band, replaced it by #39-653241 and released the bird. This Murre was recaptured by me on this same island on August 2, 1941, at which time I removed band

HYBRID FLICKER AT CHATHAM, ONTARIO.—A flicker was collected May 13, 1941, near Chatham, Ontario, the first one recorded from this locality to show hybridization with the western red-shafted flicker. Eight tail feathers had red shafts and the red under-coloration. The two central tail feathers were typical yellow *luteus*. The two wings were identical: first primary, typical *luteus*; second, shaft orange; third and fourth, shafts red; fifth, basal two-thirds of shaft red shading through orange to yellow at the tip. Otherwise, the bird had the coloration of *luteus*. The measurements were: length, 300 mm.; wing, 158 mm.; tail, 103 mm. and tarsus, 30 mm.—A. A. WOOD.



## LARUS KUMLIENI AND ITS ALLIES \*

By A. L. RAND

Ornithologist, National Museum of Canada, Ottawa

NO TWO ANIMALS are exactly alike, nor is it likely that any two populations of animals are identical. When the differences between populations are great enough, and constant enough, to enable one to distinguish seventy-five per cent or more of two populations from each other it is customary to consider them subspecies. These subspecies, or geographical variants, are probably incipient species;—species in the making. One of the best demonstrations of this is where two quite distinct forms inhabit the same area, but represent opposite overlapping ends of a circle of intergrading subspecies. Mayr (*Amer. Nat.*, 74: 249-278, 1940), has brought together a number of such examples, but they are rare.

From a study of the Nearctic gulls of the genus *Larus* in the National Museum of Canada, it appears that they represent such overlapping series of intergrading forms. The entities concerned are *hyperboreus*, *barrovianus*, *nelsoni*, *leucopterus*, *kumlieni*, *thayeri* and *smithsonianus*. Dwight (*Bull. Amer. Mus. Nat. Hist.*, 52: 63-336, 1925) lists them as *L. hyperboreus* (*L. nelsoni* as a hybrid between *L. hyperboreus* and *L. argentatus vegae*) *L. leucopterus*, (*L. kumlieni* as a hybrid between *L. leucopterus* and *L. a. thayeri*) *L. argentatus thayeri* and *L. a. smithsonianus*. This has been widely accepted. Stegmann (*Journ. f. Ornith.*, 82: 340-380, 1934) from a *formenkreis* point of view has included *leucopterus* in *argentatus*, regarding *thayeri* as an intergrade, and *kumlieni* as a hybrid; but *hyperboreus* he regards as a separate species, in which he includes *glaucescens*, and *nelsoni* as a hybrid between them. Taverner (*Can. Field-Nat.* 47: 88-90, 1933) has shown that *kumlieni* has a definite breeding range in an area where *smithsonianus* also breeds, and where neither of *kumlieni*'s alleged parents occur.

The following is a brief outline of the breeding distribution and relationships of these birds in the Nearctic, as it appears to me, from a review of available material. For descriptions of plumages see Dwight (*l.c.*).

### HYPERBOREUS

*Larus hyperboreus* Gunn.

Breeding from Newfoundland, Labrador, Hudson Bay, and Coronation Gulf to Greenland, and Ellesmere Island.

This is a large, big-billed, grey-mantled white-primaried bird, with a pale white-

winged immature plumage. There is little variation in its characters over the area.

Apparently a small proportion of the adults migrate southward in winter.

It is a distinctive form, liable to be confused only with the next.

### BARROVIANUS

*Larus barrovianus* Ridgway

Breeding in the Mackenzie Delta and Point Barrow areas.

This is a western representative of *hyperboreus* distinguished by smaller size, shorter, more slender bill, darker mantle, and more greyish primaries. The young differ in their smaller size.

Oberholser (*Auk*, 35: 467-474, 1918) demonstrated the distinctness of this form, as did Bishop (*Condor*, 29: 204, 205, 1927) but Dwight (*l.c.* and *Auk*, 36: 242-248, 1919) did not recognize it and most people followed his example.

However it is a distinguishable form. It is interesting to note that *hyperboreus* and *barrovianus* do not represent opposite ends of a "cline". The difference between the two populations, although not great, is abrupt and if intergradation occurs it must be in the small area between Coronation Gulf and the Mackenzie Delta area.

### NELSONI

*Larus nelsoni* Henshaw

Definitely known from but a few western Arctic specimens (none examined). It is a grey-mantled bird with a lightly grey patterned wing. It appears to bear the relationship to *barrovianus* that *kumlieni* does to *leucopterus* (see below) and the darker primaries of *barrovianus* accentuate this. The form *kumlieni* appears to be its geographical representative. Thus, if the direct relationship between *leucopterus* and *hyperboreus* be doubtful, there is also this indirect line of relationship. As to the young, I have seen Pacific coast first year birds that could be considered either *glaucescens* or *nelsoni*.

### LEUCOPTERUS

*Larus leucopterus* Vieillot

Only known to breed in Greenland (Taverner, *l.c.*).

This is a smaller edition of *barrovianus*, with a considerably smaller, more slender bill. I have no fully adult material.

Evidently only a small proportion of the adults migrate southward. Differing from *barrovianus* only in size, especially of bill, my scanty material does not show an overlap.

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But published records of *leucopterus* from north-western America indicate that it may happen, as witness Bishop's record (*Program Activities Chicago Acad. Sci.*, 4: 30, 1933) of an adult *leucopterus* with a large bill from Wainwright, Alaska. He even suggests it may be a hybrid *leucopterus* X *hyperboreus*.

#### KUMLIENI

*Larus kumlieni* Brewster

Breeds in south Baffin Land and northern Ungava (Taverner, *l.c.*).

The adult is a grey-mantled bird with, typically, a grey pattern on the white primaries; the bill averages slightly larger than in *leucopterus*. That some of the young are separable from those of *leucopterus* is doubtful (see below).

Most of the grounds for considering this form a hybrid between *leucopterus* and *thayeri*, and the objections to considering it a valid form, have disappeared with the discovery that it has a breeding range in which neither of the two alleged parent species occur (Soper, *Nat. Mus. Canada*, Bull. 53: 83, 84, 1928, and Taverner, *Can. Field-Nat.*, 47: 88-90, 1933).

It is true that *kumlieni* is variable in wing pattern, but so is *thayeri* and so are other forms. The fact that the variation in *kumlieni* is near the disappearing end of the patterned series makes this variation more evident.

A biological difference, not hitherto noted, is that the proportion of adult *kumlieni* that comes south along the Atlantic coast in winter is greater than in *leucopterus*.

Much of the question about identifying *kumlieni* appears to have arisen over the immatures, a problem also with some distinct forms such as *smithsonianus* and *glaucescens*.

A striking thing about our series is that the ten Baffin Island adult birds are clearly referable to this form, as are nine of the ten Atlantic coast adults. A Churchill and a Cornwallis Island bird approach *thayeri* in the darker mantle, larger bill, and dark extensive pattern of the wing. They have been identified as *thayeri* by Brooks, and *kumlieni* by Taverner (on the labels). The single doubtful east coast winter bird approaches *leucopterus*, but differs in the darker mantle, greyer (unpatterned) primaries and larger bill.

It appears that *kumlieni* has a population with distinctive characters breeding over a considerable area and that occasional birds intergrade with *leucopterus* on the one hand and *thayeri* on the other. Dwight (1925, *l.c.*) recognized this, but without information as to the breeding ranges of these birds, correlated his facts with the most obvious generalization, hybridization.

#### LEUCOPTERUS-KUMLIENI

As mentioned above we have a series of 23 immature gulls of general pale color, and grey primaries that I am unable to allocate to species. They are from Nova Scotia (winter), New Brunswick (winter) and Baffin Island.

We know that the young Iceland gull is of this type (moulting specimens) as is young *kumlieni* (Hickey, *Proc. Linn. Soc. N.Y.*, 1937, No. 49: 63-66, 1938). Both forms occur here in recognizable plumages. Presumably this series represents both forms.

But in examining it I am unable to separate it into two groups with distinguishing characters.

Having few *leucopterus* for comparison I have used *hyperboreus* young for comparison. This series, in the color of wing and tail vary from slightly to considerably darker and more solidly patterned than corresponding *hyperboreus*. In color, size, and bill it forms an intergrading series. Some of the birds have been identified by Bishop, Brooks and Taverner (identifications on labels). The lightest birds have been labelled *leucopterus* unanimately, the darkest birds *kumlieni*. But there has been a diversity of opinion as to the identity of the birds in the centre of the series. In the light of present knowledge it seems undesirable to allocate names to these birds.

#### THAYERI

*Larus thayeri* Brooks

Adult summer specimens (about 30) indicate a breeding range from the northwest corner of Hudson Bay, north Baffin Land and Coronation Gulf northward.

Adults differ from *kumlieni* in the larger bill, the increase and darkening of the pattern areas on the pale primaries, and the darker mantle.

Our large series shows considerable variation, apparently correlated with neither geography, sex nor age, but only two specimens from Cornwallis Island and Churchill (mentioned under *kumlieni*) are of doubtful allocation (see above).

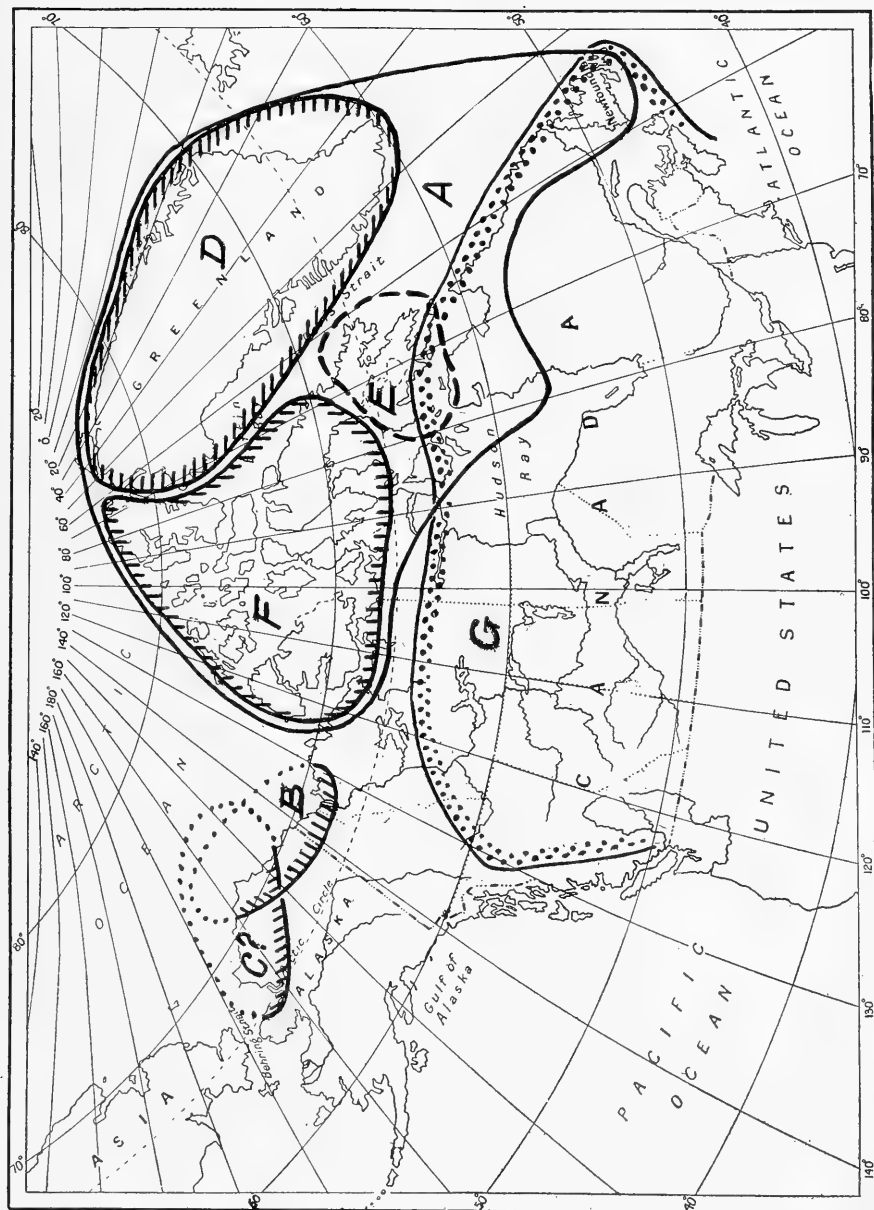
The young of *thayeri* are said to be very similar to *smithsonianus* (Dwight, 1925, *l.c.*) but we have two immatures from Banks Island (September), perhaps *thayeri*, that are only slightly darker than east coast, winter *kumlieni*, and a Teslin Lake (Y.T.) specimen (September) and a Departure Bay (B.C.) (January) immature (one identified as *thayeri* by Dwight on label) that stand about halfway between the Banks Island birds and a large series of eastern, first winter, *smithsonianus*. This suggests that the young of *thayeri* may prove to be intermediate in color between *kumlieni* and *smithsonianus*, as are the adults.

#### SMITHSONIANUS

*Larus smithsonianus* Coues

Breeds north to northern Ungava, southern Baffin Land, northwest Hudson Bay (where it overlaps *thayeri*? judging by summer adult specimens, not definitely known to be breeding, of both forms), the interior of Mackenzie and Yukon territories, and interior British Columbia.

Differs from *thayeri* in the larger bill and the greater extent and increase of pigment in the patterned areas of the wing. Two or three Gulf of St. Lawrence adult birds (one



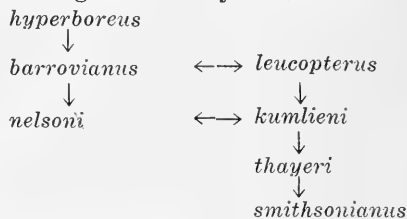
Outline of breeding ranges of certain gulls (*Larus*) in the Nearctic: A. *hyperboreus*; B. *barrovianus*; C. *nelsoni*; D. *leucopterus*; E. *kumlienii*; F. *thayeri*; G. *smithsonianus*.

in August) might be called *thayeri* on the basis of primary pattern alone, but they lack the dilution of color and the smaller bill of *thayeri*. It is probable they approach *thayeri* through individual variation rather than represent that form actually.

The undoubted first year young of *smithsonianus* from eastern Canada are dark, with dark wings and tail. Some western birds are paler (Alberta, British Columbia and Yukon) and suggest an approach to the young of *thayeri* (see above under *thayeri*).

"*Larus kumlieni* and its allies" seems to represent a chain of ill-defined, merging entities in fact as well as appearance; a series of populations that behave like subspecies in respect to their nearest relatives, but to their more distant relatives they behave as species, as is shown where they overlap. They might be considered a group of nascent species because the connecting links have not disappeared, as they have in most present day species. If certain connecting links disappeared, the remainder would undoubtedly be considered species.

The relationships of the group can be represented diagrammatically thus:



The accompanying map shows their overlapping distribution.

It is necessary to express this relationship in a conventional nomenclatural system, and I would suggest the following:

1. *Larus hyperboreus hyperboreus*
2. *Larus hyperboreus barrovianus*
3. *Larus leucopterus nelsoni*
4. *Larus leucopterus leucopterus*
5. *Larus leucopterus kumlieni*
6. *Larus argentatus thayeri*
7. *Larus argentatus smithsonianus*.

In preparing this paper I have had the privilege of discussing it at length with Mr. P. A. Taverner.

#### MR. P. A. TAVERNER RETIRES

It is with real regret that *The Canadian Field-Naturalist* publishes the following announcement of the retirement of Mr. P. A. Taverner as Ornithologist of the National Museum of Canada. Mr. Taverner has served long and well and this journal is deeply indebted to him for his services as Associate Editor (Ornithology) over a period of many years.—Editor.

This will announce to those interested that, after thirty-two years, I have reached the legal limit of service and have retired from the position of Ornithologist in the National Museum of Canada. The Division of Ornithology will continue under the direction of Dr. A. L. Rand, whom I heartily recommend to correspondents, friends of the Museum and ornithologists in general. I hope they will extend to him the same support and assistance that has made my past labors pleasant. Future official communications should be addressed to him.

This does not mean that I will be dropping interest in ornithology or in the Museum for I hope to carry on in private capacity much as in the past. I will always be glad to hear from my ornithological and other friends. Until further notice my address will be:—

P. A. TAVERNER,  
45 Leonard Avenue,  
Ottawa, Canada.

#### ATTENTION, HERPETOLOGISTS

In the *Canadian Field-Naturalist* for February 1942 we published an announcement of our forthcoming check list of amphibians and reptiles of Canada, and a request for distributional information and specimens from various regions from which we have inadequate data. In certain of the replies to our request for specimens some of our correspondents have asked for exchange material, so perhaps a general statement would be in order. The large amount of time and labour involved in the preparation of such a check list is a purely voluntary service for the benefit of herpetologists in general, and for which the authors receive exactly nothing. The request for specimens and data to forward this work is reasonably and of necessity a request for voluntary service on the part of other herpetologists who may be sufficiently interested to co-operate in the belief that the check list will be useful to them and others. All contributions of information or specimens will be fully acknowledged in the check list, but if the authors were expected to supply exchange specimens in return for material sent them in a work covering so large an area the hope of securing and examining such material would have to be abandoned. The ultimate success and usefulness of this work must depend in no small degree upon the willingness of those living in other parts of the North American continent to co-operate voluntarily, since it is manifestly impossible for the authors to visit and collect in all, or any, of the regions from which information or specimens are desired, or to provide material compensation for assistance rendered.

E. B. S. LOGIER and G. C. TONER,  
Royal Ontario Museum of Zoology.

## THE INDIAN AS CONSERVATIONIST

By C. H. D. CLARKE

*National Parks Bureau, Ottawa*

OUR CANADIAN INDIANS are by nature conservationists. Under primitive conditions in their most destructive moments they merely took their place with other flesh-eaters at the top of the "pyramid of numbers", depending on, but not controlling in any way, the population of game animals. The traditions of conservation are still strong, and when we hear of wanton destruction of wild life by Indians to-day it almost always means that the old tribal hunting arrangements have been broken down by white encroachment, and the Indian in question has unfortunately but understandably seen fit to emulate the white man in destruction.

Most naturalists are kindly disposed towards Indians, but when it comes to defending them they often do not have the advantage of familiarity with published accounts of the Indian system of hunting. For that reason some of the classical descriptions of Indian hunting systems might well be repeated.

In *Les Bourgeois de la Compagnie du Nord-Ouest*, by L. R. Masson, Quebec, 1889, the hunting customs of the Indians of Western Ontario about 1804 are described as follows (Vol. 2, p. 326):

"It is customary with them, in the beginning of winter, to separate in single families, a precaution which seems necessary to their very existence, and of which they are so sensible that when one of them has chosen a particular district for his hunting ground, no other person will encroach upon it without a special invitation, and whoever discovers a beaver lodge and marks its situation may consider it his undoubted property, and no other person will help to destroy it without his permission. In case of famine, however, any one may abandon his district and seek a better hunt on his neighbour's land without incurring the least ill will or reproach."

In the same volume (p. 68-69) the hunting customs of the Beaver Indians of the Northwest Territories are described, January 7, 1807:

"These Indians are very honest with regard to property, and are extremely particular regarding their hunting regulations. For instance, when an Indian discovers one or more beaver lodges, if not already appropriated, he immediately puts a mark upon them, and no one dares to intrude upon his property without his permission, although I know of no punishment inflicted upon the guilty party unless it be the infamy attached to the action, which is considered as very mean and heinous."

There were very few parts of Canada where a white man could hunt without committing trespass so far as Indian custom was concerned, but most white men never became aware of the censure to which they fell heir when they invaded Indian trapping grounds. The first trespassers were the hunters brought by the traders themselves, and since they were associated with a traffic which gave new values to the products of the Indian's hunting in terms of new weapons and marvellous gadgets, it is likely that the Indian was rather loath to face up to the problem of invasion of tribal rights, although in some instances Indians suggested that the traders buy their meat and do no hunting. On page 109 of Volume 1 of Masson, in a letter dated February 28, 1814, we read: "Athabaska itself is in fact dwindling down to nothing. The Indians complain of want of beaver, (the Iroquois having ruined the country)." In other words, a few short years of ruthless exploitation were enough to deplete one of the farthest wildernesses as long ago as 1814.

A footnote remarks that the North-Westerners often took Iroquois Indians with them as hunters, to provide the trading posts with game, and that, having no interest in the country, these Indians hunted recklessly and at all seasons and were much disliked in the North-West. From keeping silence in the face of invasion to active imitation of the invaders is a not illogical step. Division of hunting rights was the general custom of the Indians, and each hunter was obliged to conserve the resources of his territory for his sons. In the face of the invader's complete disregard for Indian laws, the conservation practised for centuries broke down.

One of the keenest observers among the early explorers of Canada was David Thompson. In his *Narrative of Explorations in Western America, 1784-1812* published by the Champlain Society, Toronto, 1916, he states, speaking of the country now occupied by our three prairie provinces (p. 110):

"... it might justly be supposed the destruction of Mankind (by smallpox, about 1782, when more than half of the Indians are said to have died) would allow the animals to increase, even to become formidable to the few Natives who survived, but neither the Bison, the Deer, nor the carnivorous animals increased and as I have already remarked, are no more than sufficient for the subsistence of the Natives and traders".

This passage, interesting as an example of the primitive balance of nature, shows most clearly that the Indians, even in the days of their greatest abundance, lived off the surplus

of animal life, and did not affect the supply in any way. Nowadays, however, white trappers can move into an area, sometimes by aeroplane, and make a clean sweep of its fur resources in one season. With experience or knowledge of such happenings it is no wonder that many Indians try to anticipate them.

One of the most significant facts about the beaver and muskrat rehabilitation projects now being carried out by the Hudson's Bay Company, the Indian Affairs Branch and vari-

ous territorial and provincial authorities is that Indians are active partners. Though these projects are still in their infancy it is already well established that they are sound and practical. The initial successes have astonished even the sponsors. There should be no surprise at the part the Indians have played; conservation to them is an ancient philosophy, which sometimes may not have been heeded under stress of circumstances, but which was never discarded.

## NOTES ON SOME FISH OF THE EASTERN CANADIAN ARCTIC

By T. H. MANNING

THE FOLLOWING notes are the result of observations made for three years at Southampton Island, two years on the central west coast of Baffin Island, and one winter at Repulse Bay and Wager Inlet. I am grateful to Professor J. R. Dymond of the Royal Ontario Museum of Zoology for identifying the few specimens collected, and for suggestions with regard to this manuscript.

### *Salvelinus alpinus* (Linnaeus). ARCTIC CHAR.

Commenting on specimens (unfortunately in poor condition) of this species, Professor Dymond says: "*Salvelinus alpinus* from Arctic America has been given many scientific names including *S. stagnalis*, *S. alipes*, *S. rossii*, *S. hearnii* etc. There are undoubtedly local variations among Arctic Char as there are among other wide-ranging species, but they have not yet received sufficient study to enable us to know which of them are worthy of sub-specific names. As in the case of salmonoid fishes, individuals differ widely depending on ecological conditions."

In summer, Arctic Char are found along most of the coast above-mentioned, and are abundant in many places. The best catches are made with a net set in 4 to 10 feet of water, preferably on a small point, for although the fish keep close to the shore, they do not always enter the small bays. Along steep rocky coasts where there is no shallow water, the fish seem scarcer. This may be due to the comparatively small cross-section of water occupied by the net. Obviously they are not likely to be numerous on long stretches of coast that are devoid of suitable streams. How far the fish go out to sea is not known. We caught none at Walrus Island, 30 miles off Southampton Island, although a net was kept out for a week in early August, 1936. They are regularly caught at Igloodik Island, but this is only three miles off the mainland.

In winter, they occur in varying numbers in most lakes deep enough not to freeze to the bottom, and which are connected to the sea

by a brook or river up which the fish can pass. I have no certain information with regard to their occurrence in lakes during summer as no fishing is then done. I think it improbable that any Arctic Char remain in the sea during the winter. Certainly nets set out in early June, as soon as ice conditions allow, frequently draw blank for some days. When the fish do arrive, the catches made during the first few days are often the heaviest of the whole year.

Following are the dates on which the first Arctic Char were caught in the sea in various years. In all cases the nets had been set earlier, but no fish had been caught.

1934 Gibbons Point, Southampton Island, July 8.

1936 Gibbons Point, Southampton Island, July 14.

1938 Figgures Point, Taverner Bay, W. Baffin Island, July 14.

1937 Anderson River, Southampton Island. None were caught between July 12 and July 14.

I believe Arctic Char can usually be caught at the mouths of brooks during the latter half of June. Probably the exact date at which they leave the brook mouths is determined by the break-up of the ice along the shore, and perhaps it may be delayed by heavy pack ice. I have, however, several times seen them swimming amongst scattered pack.

Arctic Char begin to collect in and around the entrance of the brooks early in August, but some can usually be caught elsewhere along the shore at least as late as the end of that month. Probably the actual date on which they go up the rivers depends on the amount of water coming down. In the fall of 1936 the water in a river at the head of Gore Bay, Melville Peninsula, was too low for the fish to ascend, and they remained packed near the mouth till after freeze-up. Several thousand were speared by the Eskimos, who said they were so closely packed that it was impossible to miss. We first set nets in the fresh water at the mouth of Canyon River (north-east

coast of Southampton Island) on August 8, 1937. Fifty char were caught that day, but soon the catch decreased, until from August 15 to August 20, an average of only two a day was obtained. Whether this was due to the number (about 200) previously caught, or to the fish having gone upstream or out to sea, was not determined; the stomachs of many contained amphipods which were not present in the fresh water where they were caught. We first set all our nets in the salt or brackish water at the mouth of Hantzsch River, west coast of Baffin Island, on August 27, 1938, and thereafter they were visited regularly once a day until September 10. Fifty-four fish were caught in the first twenty-four hours. From then to September 10 we obtained an average of 28 a day, with a maximum of 64 on September 4, and a minimum of 19 on September 6. Fish continued to be caught after September 10, but in smaller numbers. Some char were seen in the river above the first rapids on September 4.

The maximum size of char caught in the sea is fairly constant from place to place, and their weight probably rarely exceeds 6 pounds (estimated). However, two very large ones were obtained from the Eskimos on the north side of Parry Bay, Melville Peninsula, on September 11, the largest being almost double the maximum size I have seen caught elsewhere. The mouth of a river flowing from the large Hall Lake may have been near. The colour, firmness and flavour of the flesh is variable even in those caught at the same time and place.

The Arctic Char caught in some of the larger lakes on Southampton Island (and elsewhere) differ from those caught in the sea and the mouths of brooks in the colour of the lower belly which is shaded with bright red. The red-bellied fish are at least partly segregated from the others, being found only in certain lakes, and the evidence suggests that the colour is not seasonal or sexual but characteristic of fish that do not migrate to the sea in summer, possibly owing to the small size of the streams leaving these lakes. Definite evidence is lacking. The maximum size of this form obtained from lakes on Southampton Island seems to be rather larger than that of the char caught in the sea around the island. Similar red-bellied fish, but considerably larger (estimated weight 15 pounds) than any I have seen from Southampton Island, are caught in Brown Lake (Kominaluk), and in the river joining that lake to Ford Lake (Teshiujuk). The latter lake connects with the head of Wager Inlet by reversing tidal falls. According to the Eskimos, a similar large fish occurs in Lake Netilling, Baffin Island. Soper\*, however, did not obtain any there.

In October and November of 1938, about 35 Arctic Char were caught in a broadening of

Hantzsch River about three miles from the mouth. Six of those caught during the first week were of the normal form found in the sea during the summer, and in many lakes during the winter. Eight hundred of these fish had been obtained earlier just outside the mouth of the river, and were then presumably on their way to lakes farther up. The remaining 29, some of which were caught on the same dates and some later, were quite different from any that I, or the Southampton Island Eskimo who was with me, had previously seen. The largest of these fish were considerably smaller than the largest caught at the mouth of the river, but were more than double the weight of the smallest. A few caught at the mouth probably weighed no more than half a pound (the minimum size was limited by the mesh of the net). The 29 fish referred to above showed minor individual variations in colour, but could clearly be divided into two distinct forms:

(1) Dorsal surface and fin, dark olive brown; belly, white; sides, spotted with pink; caudal fin, greyish-brown, sometimes edged with orange; remaining fins, usually greenish-brown, variably tinged and edged; gill covers, yellowish-brown to olive green.

(2) Similar to (1) except that the belly was orange and the sides spotted with orange instead of pink.

The sides of both sometimes showed broad bluish W-shaped bands.

It is possible that the difference in the two forms is sexual, in which case the first form is the male.

#### *Cristivomer namaycush* (Walbaum). LAKE TROUT.

A single head was obtained from an Eskimo; the fish had been caught in a large lake in the limestone district near the centre of Southampton Island. The first fish caught in the broadening of Hantzsch River above-mentioned was very similar and almost certainly of this species, although unfortunately it was not preserved, and no more were taken. One was seen at Repulse Bay; it had been taken somewhere to the west of there.

#### *Pungitius pungitius* (Linnaeus). NINE-SPINED STICKLEBACK.

A few were taken in a small lake about two feet deep, near but quite unconnected with Hantzsch River. Similar fish were seen in several other small lakes in the district.

#### *Oncocottus quadricornis* (Linnaeus). FOUR-SPINED SCULPIN.

Three were taken in the salt water at the mouth of Hantzsch River. A few small ones were collected on August 7 at the north side of the mouth of the Koukdjuak River, where hundreds could be seen in all the small, brackish tidal pools that extended over an area of at least two square miles.

\* Soper, J. Dewey. A Faunal Investigation of Southern Baffin Island. *Nat. Mus. Can.*, Bull. 53. Biol. ser. 15: 116-118, 1928.



## HACKBERRY IN THE OTTAWA DISTRICT \*

By HERBERT GROH

Div. of Botany, Dept. of Agriculture, Ottawa

IN THE *Catalogue of Canadian Plants* Macoun has this to say about *Celtis occidentalis* L.: "Without exception this tree has the most remarkable distribution of any in the Dominion." Then follow citations of localities from Montreal and Ottawa to Niagara and Point Pelee, and a report by Bell from "vicinity of Rat Portage, Lake of the Woods." According to Morton and Lewis in *Native trees of Canada* its range is "the valley of the St. Lawrence from Montreal westward through southern Ontario". They and Macoun alike refer to its sparing and curiously local occurrence.

For the Ottawa district Fletcher's *Flora Ottawaensis* about 1880, records: "A few trees along the Rideau above Billing's Bridge, and one or two small ones at Malloch's Bay and Britannia on the Ottawa." More recent members of the Ottawa Field-Naturalists' Club have been familiar with a specimen growing along the road near the Fairmont Golf Course at Fairy Lake about where the Mine Road forks off. This was cut down a few years ago but has again produced a thicket of coppice growth. At least one or two members have secured plantings from this station. Another tree is also reported remaining along Lover's Walk on Parliament Hill.

The existence of one or more individuals should warrant expectation of others. Neither the older nor new stations, however, had rewarded anyone's field work in the district, to my knowledge, for many years. Then, on the evening of July 15, 1942, while inspecting some experimental plots close to a tree at Ottawa West it dawned on me that this was not another of the elms about me, but as a glance upward at the fruit revealed, a hackberry, and growing on ground which I had been crossing for upwards of fifteen years. This was some twenty-five rods to the north of the C.P.R. tracks, a little west of Ross Ave., on shallow soil over limestone strata.

Again, while out on July 24 with the Y. M. C. A. Summer Club in the Federal District Commission woods between Hull and Gatineau Point, one of the boys brought to me for identification what I at once recognized as the very inequilateral leaves of hackberry. He was able to direct me to the tree, which was not a large specimen and bore no fruit, but the characteristically wart-like ridges of the bark helped to confirm its identity. It was crowded among trees of other hardwoods on the alluvial soil near the Ottawa River.

There is rather a dearth of specimens on which to base any review of Ottawa district distribution. The following citations are from the National and the Division of Botany herbaria, the former being distinguished by (Can) following.

QUEBEC: Roadside close to forks of road, Scott's Farm, Mine Road, west of Hull, *John Macoun*, June 11, 1911 (Can); Fairy Lake, *E. G. Anderson*, May 21, 1932; Hull-Gatineau Point road in Federal District Commission woods, *H. Groh*, July 24, 1942.

ONTARIO: Ottawa district, comm. by *Abbé V. A. Huard*, October, 1907; south side of Mississippi River near foot of rapids, Carleton Place, *A. H. D. Ross*, June 11, 1909 (Can); Ottawa West, *H. Groh*, July 15, 1942.

One other record is appended as evidence of the remarkable distribution of this tree.

MANITOBA: A small tree at south end of Lake Manitoba, collector not stated, 1908 (Can).

The specimen has exceptionally pubescent twigs and may be a distinct variety. Variation is quite wide in *Celtis*, of which there are a number of North American species. As well there are several varieties of *C. occidentalis* which occur within our Canadian borders.

## H. C. MILLER

Born January 25, 1890, Toronto.  
Died November 4, 1942, Ottawa.

The Ottawa Field-Naturalists' Club lost a very good friend by the death of Mr. H. C. Miller, who, for over twenty years, was printer of *The Canadian Field-Naturalist*.

All members of the Club who came in contact with him during these many years know how generous he was with his time and energy whenever help was needed. Many an extra page has been donated by him to the Club in the "lean years" when it was such a struggle to keep the "Naturalist" alive and flourishing. Always cheerful, a born wit and an untiring worker, he was never too busy to go out of his way to help settle some of the many problems that were bound to arise in the publication of a technical scientific journal such as ours.

Mr. Miller was not a naturalist, but Canadian naturalists owe much to him for his very real contribution to the cause of natural history. His many friends in the Club will miss him, and their sympathy is extended to his family.—WILMOT LLOYD.

\* Contribution No. 720 from the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada.



## THE SUMMER BIRDS OF THE MADSEN AREA, PATRICIA DISTRICT, ONTARIO

By E. V. GOODWILL

Ottawa, Ontario

**T**HE MADSEN AREA lies in the Red Lake gold mining district of north-western Ontario, approximately fifty-five miles east of the Manitoba boundary and ninety miles north of Kenora. The mine and townsite of the Madsen Red Lake Gold Mines Limited are situated about six miles southwest of the town of Red Lake.

The following list of birds has been prepared from casual field notes made between May 25, 1938, and September 8, 1938, and is based entirely on sight records. The majority of my observations were made within a radius of a mile and a half from the Madsen clearing in Baird Township with occasional records from Heyson Township and from Red Lake in Dome Township. Unless otherwise stated in the report the records are from Baird Township.

Although only fifty species are herein listed, this report is submitted in the hope that it will add somewhat to the meagre knowledge of the birds that occur in the northern portions of Ontario. Many more species were seen but satisfactory identifications could not be obtained. In some cases where there may be some doubt as to the correctness of the identification the particulars surrounding the observation have been given.

*Gavia immer*. COMMON LOON.—Two were observed flying over the High Lake clearing on the evening of July 26, one over Madsen clearing on the evenings of July 29 and August 10, two over Madsen August 12 at 7 a.m., and one on High Lake evening of August 27.

*Ardea herodias*. GREAT BLUE HERON.—Recorded at Flat Lake on June 4, and at Russet Lake on August 17, August 24, and September 4.

*Glaucionetta clangula*. COMMON GOLDEN-EYE.—A female was observed on Round Lake on June 28 and August 16.

*Buteo platypterus*. BROAD-WINGED HAWK.—On May 30 a hawk of this species was identified through 8x binoculars as it soared close overhead over the Madsen clearing.

*Falco sparverius*. AMERICAN SPARROW HAWK.—A pair of these falcons were observed fairly regularly in each of the Madsen and High Lake clearings but no nesting evidence was obtained. On September 4 one was observed at Faulkenham Lake in Heyson Township.

*Canachites canadensis*. SPRUCE GROUSE.—On August 27 I came upon two birds of this species at the border of the High Lake clearing and was able to approach within a few

feet to examine them. On August 28 I saw an adult female with what appeared to be three juveniles in a spruce woods west of Round Lake.

*Bonasa umbellus*. RUFFED GROUSE.—On June 16 and 28 one was seen in the woods at High Lake. On July 3 I found a female with six young in the High Lake clearing. These juveniles were about half the size of the adult bird and could fly quite well. On July 3 I flushed three from low shrubbery in the same clearing.

*Porzana carolina*. SORA RAIL.—On August 1, I identified a juvenile sora rail under rather unusual circumstances. This bird was found on the bare ground in front of one of the Madsen bunkhouses at least 100 yards from the nearest marshy ground and made no attempt to fly when handled. It was apparently sick for its head hung over to one side and kept twitching regularly. I placed it in the shelter of some shrubs and saw it there four times the following day. On August 21 I flushed another juvenile from a muskeg in the Madsen clearing where the tailings from the new gold mill were then starting to deposit.

*Oxyechus vociferus*. KILLDEER PLOVER.—A pair was seen regularly in the Madsen clearing from June 3 until July 29 after which no more records of this species were secured. On June 30 I saw an adult with four very small flightless downy young ones in the Madsen ball park clearing, the female feigning an injured wing in an attempt to attract attention from the young. At dusk on July 19 I saw an adult and three juveniles of the year fly up off the Madsen ore dump.

*Capella delicata*. WILSON'S SNIPE.—One seen at 7 p.m. on June 8 in a muskeg in the Madsen clearing.

*Actitis macularia*. SPOTTED SANDPIPER.—One pair was observed regularly at Beaver Dam Lake at Madsen from May 25 until August 2. On May 30 copulation was observed to establish this species as a breeding bird of the area.

*Tringa solitaria*. SOLITARY SANDPIPER.—During the evening of August 31 one was identified at a mud puddle on the tractor road in the High Lake clearing.

*Larus argentatus*. HERRING GULL.—Recorded about fifty at the town of Red Lake in Dome Township on May 28, an adult over Russet Lake in Baird Township on June 19, and an adult over Faulkenham Lake in Baird and Heyson Townships on August 8.

*Coccyzus americanus*. YELLOW-BILLED CUCKOO.—At 4 p.m. on August 15 I was walking through the High Lake clearing south of the Madsen mine when I noticed a bird flying from one treetop to another about 15 feet above the ground along the west edge of the clearing, and knew at once from the outline in flight that it was a cuckoo. Through 8x binoculars at about 150 to 200 feet I saw that it had white markings in its tail and large conspicuous cinnamon patches on its wings best seen when the bird was flying. It was too far away to see the colour of the bill or the presence or absence of a red eye-ring. This was the first cuckoo I had ever seen and because of the northerliness of the locality I was inclined at the time to think it must be a Black-billed Cuckoo, in spite of the fact that I had distinctly observed the wing patches that stood out clearly different in colour from the rest of the wing.

Since that time I have become thoroughly familiar with the Black-billed Cuckoo and have made one other observation of the Yellow-billed Cuckoo on October 6, 1939, at Ashbridge's Bay, Toronto. In all my "Black-bill" observations I have never noticed any trace of cinnamon coloration on the wings, but the Yellow-billed Cuckoo seen on October 6 distinctly showed these patches, both close and at a distance, and recalled to my mind the bird I had seen at Madsen. An examination of the wings of the two species on the skins in the collection at the Royal Ontario Museum of Zoology also tended to support my identification. Only one of all the "Black-bill" skins showed some cinnamon coloration but not nearly as distinct as those of the "Yellow-bill" and seemed to blend into the wing so that, as I thought, it would not be noted as a distinctive mark at a distance the first time one observed a cuckoo.

*Chordeiles minor*. NIGHTHAWK. — First heard late in the evening of May 31, over the Madsen clearing and first seen on the evening of June 3. Thereafter at least two were to be seen practically every evening, six being seen flying together during the evenings of June 4 and July 11. Last recorded on August 7.

*Megaceryle alcyon*. BELTED KINGFISHER.—Recorded as follows: One at Russet Lake on July 10 and August 17, one over Beaver Dam Lake at Madsen on August 9, two at Flat Lake on August 22, and one at Round Lake on August 28.

*Colaptes auratus*. YELLOW-SHAFTED FLICKER.—Along with the yellow-bellied sapsucker this was the most common of the woodpeckers in the area. It was present from June 16 to September 7, four seen on September 1 being the most on any one day. On September 4 one was seen at Faulkenham Lake in Heyson Township.

*Sphyrapicus varius*. YELLOW-BELLIED SAPSUCKER.—A fairly common summer resident in Baird Township, where it was present from June 5 to September 5. Five seen on July 17

were the most recorded on any one day. On July 3 I saw a male at its nest hole about thirty-five feet up in a poplar tree at High Lake. A female flew up to the same hole carrying something in her bill that looked like food for nestlings.

*Dryobates villosus*. HAIRY WOODPECKER.—On July 3 I found a male and female along the south edge of the Madsen clearing and a female there again on August 15. On August 26 I saw three in the High Lake clearing, and on September 7 one in the woods between Madsen and High Lake.

The Downy Woodpecker was strangely absent from the Madsen area as far as my observations show.

*Picoides arcticus*. ARCTIC THREE-TOED WOODPECKER.—On June 19 I identified a male and female Arctic Three-toed Woodpecker in Heyson Township beside the tractor road from Madsen to Red Lake. Subsequently observations of this species were made in Baird Township on July 12 and 16 along the edge of the Madsen clearing, on August 15 in the bush between the Madsen and High Lake clearings, and on September 4 on the east shore of Russet Lake.

*Picoides tridactylus*. AMERICAN THREE-TOED WOODPECKER.—On June 26 I identified an American Three-toed Woodpecker in the Madsen clearing and another on the east shore of Russet Lake. On June 28 I found one in the bush between the Madsen and High Lake clearings, and on August 26 two near High Lake.

*Sayornis phoebe*. EASTERN PHOEBE.—A pair was recorded in the Madsen clearing off and on all summer from June 25 to August 26.

*Empidonax sp.?* EMPIDONAX FLYCATCHER.—On August 28 I saw three of these small flycatchers along the border of the swamp willows and alders in the low ground between High Lake and Round Lake. As they were silent definite identification was difficult but they were most likely Traill's, judging from their habitat.

*Nuttallornis mesoleucus*. OLIVE-SIDED FLYCATCHER.—On June 8 and 19 one was watched through 8x binoculars on commanding perches above the woods between Madsen and Russet Lake. Its call-notes were heard on the latter date.

*Iridoprocne bicolor*. TREE SWALLOW.—An occasional summer resident, single birds being noted over the Madsen and High Lake clearings on six occasions between June 2 and July 11.

*Perisoreus canadensis*. CANADA JAY.—A fairly common summer resident in the woods in Baird and Heyson Townships. Generally just one or two were seen on any one day but on August 28 ten were seen in the vicinity of Round Lake.

*Cyanocitta cristata*. BLUE JAY.—Three were seen at High Lake on August 28.

*Corvus brachyrhynchos*. AMERICAN CROW.—Recorded as follows: Two east of Madsen on June 5, one at Faulkenham Lake on August 27, and one at Round Lake on August 28.

*Penthestes atricapillus*. BLACK-CAPPED CHICKADEE.—Four were seen in the woods east of the Madsen clearing on June 25 and again on July 17 between Madsen and Russet Lake. On September 5 one was seen at Round Lake.

*Penthestes hudsonicus*. BROWN-HEADED CHICKADEE.—On June 19 I identified a pair beside the Red Lake tractor road just east of Madsen. On July 3 two were found associating with a pair of red-breasted nuthatches at High Lake. On July 17 one was seen between Madsen and Russet Lake.

*Sitta canadensis*. RED-BREASTED NUTHATCH.—On June 28 I saw one in the top of a dead spruce beside High Lake, and on July 3 I came upon a pair of them creeping about this same dead tree. Their actions on the latter occasion made me suspect that they had a nest close by, but no definite nesting evidence was obtained. On July 17 I saw one between Madsen and Russet Lake.

*Certhia familiaris*. BROWN CREEPER.—Recorded as follows: One between Madsen and High Lake on June 16, one in a poplar forest west of Round Lake on July 3, two between Madsen and Russet Lake on July 17, and one near High Lake and another near Russet Lake on August 28.

*Nannus hiemalis*. WINTER WREN.—One was seen under the logs of a corduroy road in the Madsen clearing on May 30 and June 4. My third and last observation was at Round Lake on September 5.

*Turdus migratorius*. AMERICAN ROBIN.—A common summer resident noted frequently in the Madsen clearing, less often at Russet and High Lakes and twice in Heyson Township. The only nesting evidence obtained was on August 15 when I saw three juveniles in the Madsen clearing being fed by their parents.

*Hylocichla guttata*. HERMIT THRUSH.—On July 3 one was seen beside a bush trail between Round Lake and the southern part of Flat Lake.

*Hylocichla fuscescens*. WILSON'S THRUSH.—One was seen at High Lake on July 3 and August 28.

*Sialia sialis*. RED-BREASTED BLUEBIRD.—A pair was seen in the Madsen clearing on the evening of June 11.

*Bombicilla cedrorum*. CEDAR WAXWING.—On August 26 and 28 I watched a flock of thirty in the High Lake clearing. Some of them

were juveniles of the year and were observed being fed by their parents.

*Dendroica magnolia*. MAGNOLIA WARBLER.—On July 17 a male was seen, singing in the woods between Madsen and Russet Lake.

*Dendroica coronata*. MYRTLE WARBLER.—Observed as follows: One on June 11, one on July 3, and two on August 27 along the edge of the Madsen clearing, and one on August 26 at the edge of the High Lake clearing.

*Dendroica castanea*. BAY-BREASTED WARBLER.—One was seen in the woods between Madsen and Russet Lake on June 8 and heard again in the same place on June 19. On July 3 a male was seen east of Madsen.

*Seiurus noveboracensis*. NORTHERN WATER-THRUSH.—On August 28 one was seen at the swampy connection between High Lake and Round Lake.

*Passer domesticus*. ENGLISH SPARROW.—Seen only in the town of Red Lake in Dome Township on May 28 and September 8.

*Quiscalus quisqualis*. CROW BLACKBIRD.—On July 31 a flock of twenty flew north over the Madsen clearing to make my only record of them in the area.

*Spinus pinus*. PINE SISKIN.—Recorded only from the Madsen clearing near the bunk-houses as follows,—two on July 11, three on July 22, one on July 26, and one on July 28.

*Poocetes gramineus*. VESPER SPARROW.—Two were recorded on July 3 in the High Lake clearing.

*Junco hyemalis*. SLATE-COLOURED JUNCO.—The junco was the most frequently recorded bird in the area but was not abundant by any means, for five was the greatest number seen on any one day. A young bird just out of the nest and accompanied by its agitated parents was seen in the Madsen clearing on June 18 and still another on June 23. On July 3 a juvenile was seen being fed by an adult.

*Spizella passerina*. CHIPPING SPARROW.—The chipping sparrow was observed frequently in the Madsen clearing, and seen once on the east side of Russet Lake (June 26) and once at High Lake (July 3). On May 30 copulation was observed to establish this species as a breeding bird of the area. A concentration of thirty-five adults and juveniles on August 15 constitute my last observation of the summer.

*Melospiza georgiana*. SWAMP SPARROW.—On August 28 one was seen in the swampy ground between High Lake and Round Lake.

*Melospiza melodia*. SONG SPARROW.—One was seen singing in the town of Red Lake in Dome Township on May 28.

# PRECISION WITH WHICH SPECKLED TROUT (*SALVELINUS FONTINALIS*) RETURN TO THE SAME SPAWNING GROUNDS

By VADIM D. VLADYKOV

*Station Biologique du Parc des Laurentides, Université de Montréal*

**D**URING the last four years, several thousand Speckled Trout were marked with jaw tags<sup>1</sup> in the Laurentides Park, Quebec. Often fish were tagged in the fall, on the spawning beds, which are usually located at the inlet or outlet of a lake. During the summer no adult trout were noticed over these grounds. However, the next fall several marked fish were recaptured on the same places where they were tagged a year before. These observations led to the following experiments.

Lake Grand Epaule, which is situated at an altitude of 2,127 feet above sea level and about 40 miles north of Quebec city, was chosen. It is nearly two miles long by a quarter of a mile wide, with an area of 300 acres and a maximum depth of 28 feet. There are two inlets, one at the northern end about three miles long, which will be called "A", and the other at the southeastern extremity only one mile long, "B".

Inlet "A" has its source in Lake Petit Epaule (53 acres), which is located 400 feet higher than Grand Epaule. Inlet "B" flows from Lake Noël (188 acres), situated approximately 175 feet above Lake Grand Epaule. In all these three lakes only one species of fish is found, namely speckled trout (*Salvelinus fontinalis*).

Grand Epaule trout do not spawn in the lake proper, but only in the inlets. The principal spawning ground of inlet "A" is located at a distance of about one mile from the wharf at Camp Devlin, along the eastern shore of this lake, while the main spawning bed of inlet "B" is approximately half a mile from the wharf (Fig. 1).

During September, 1938, over 400 trout taken with seines on the spawning grounds, were tagged and released in Grand Epaule, almost equal numbers being marked in each of the two inlets.

In the summer of 1939 no adult trout were seen in either inlet. Only seven tagged fish were recovered during the warm season of that year, all of them taken on the fly in the lake proper, not far from Devlin's wharf. The ratio between the tagged and untagged fish caught was 1 to 1,000.

Trout on the approach of the spawning season left the lake and moved towards either

one or other of the inlets. In seining in September 1939 on the spawning beds, three tagged fish were recaptured in inlet "A" and

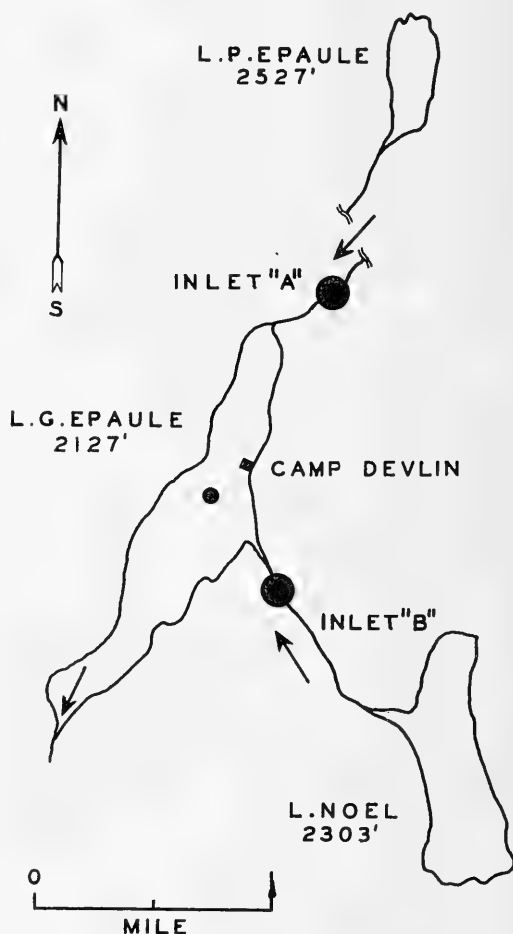


Figure 1. Lake Grand Epaule in the Laurentides Park. Large black dots show the location of spawning beds in both inlets, from which trout for tagging experiments were used. Small black dot within Grand Epaule Lake indicates the position of the station, where observations on hydrographic conditions of this lake were made and referred to in Table III, Inlet "A", which is about three times as long as Inlet "B", is shown in part.

<sup>1</sup> Description of this method is given by Shetter (1936).

one in inlet "B", all of which had been caught and released a year previously exactly on the same spots. These places had been marked by logs and rocks to facilitate finding their locations.

Of these recaptures, the recovery of a female (tag no. 722) is particularly interesting. This trout measuring 160 millimeters<sup>2</sup> was tagged, on September 19, 1938, in inlet "A" and was recaptured in 1939 on the exact spot, where it had been tagged a year before. This fish was then brought alive to Devlin's wharf and liberated there on September 12; two days later it was caught a second time at the original tagging place in inlet "A", at a distance of about one mile from the wharf.

During the fall of 1940, it was decided to repeat the experiment with Grand Epaulé trout. On September 24 and 25, 110 trout were seined in inlet "A" and 116 in inlet "B". The fish ranged in length from 122 to 258 millimeters. Each group was brought separately from the place of capture to Devlin's wharf. During

the trip in a motor boat, water in the tub was renewed several times. Then fish were tagged and liberated at the wharf.

Twenty-four and forty-eight hours later, seining was repeated exactly over the same beds in each of the inlets. During this short interval twenty trout were recovered: twelve in inlet "A" and eight in "B". Details of the recaptures are summarized in Table I. Without exception every one of the tagged fish recaptured had returned to the same ground as that to which it had previously resorted. Unfortunately it was impossible to continue these observations that fall.

Physico-chemical conditions in each of the inlets and the lake proper are given on Tables II and III.<sup>3</sup> Although only small differences in various factors were observed, they were

<sup>2</sup> Throughout the present note, the size of fish is the length measured from the tip of the snout to the extremity of the middle caudal rays.

<sup>3</sup> The determination of dissolved oxygen was made by the Nicloux method (1930) and that of free carbon dioxide by the American Public Health Association technique (1925, pp. 36-37, procedure 7a). For the determination of pH values, the Lovibond Comparator was used. Water analyses referred to in the present note were made by Mr. V. Legendre, assistant to the Biological Station.

TABLE I. TAGGING EXPERIMENT MADE WITH TROUT FROM LAKE GRAND EPAULE, DURING SEPTEMBER 24 - 26, 1940

Date	Fish released at wharf				Fish recaptured on respective spawning beds			
	♂ ♂	♀ ♀	?	Total	After	♂ ♂	♀ ♀	Total
<i>Trout from inlet "A"</i>								
Sept. 24 .....	32	17	3	52	24 hours	2	...	2
					48 "	4	1	5
Sept. 25 .....	31	25	2	58	24 "	4	1	5
Total .....	63	42	5	110	24-48 hours	10	2	12
<i>Trout from inlet "B"</i>								
Sept. 24 .....	56	28	...	84	48 hours	2	3	5
Sept. 25 .....	18	12	2	32	24 "	2	1	3
Total .....	74	40	2	116	24-48 hours	4	4	8

Remark: The lengths in millimeters of released trout varied from 122 to 258, and those of recaptured from 145 to 238.

TABLE II. PHYSICO-CHEMICAL CONDITIONS OF TWO INLETS: "A" AND "B" IN LAKE GRAND EPAULE, DURING SEPTEMBER, 1938-1940

Date	Temperature, °C.		O <sub>2</sub> , p.p.m.		CO <sub>2</sub> , p.p.m.		pH	
	A	B	A	B	A	B	A	B
Sept. 18 and 19, 1938 <sup>1</sup> .....	9.8	12.6	10.0	9.2	1.0	2.0	6.3	6.0
Sept. 14, 1939 .....	9.0	11.2	9.3	9.4	2.5	2.5	5.8	5.9
Sept. 20, 1939 .....	10.0	13.0	8.5	8.0	2.0	3.0	6.1	6.0
Sept. 22 and 24, 1940 <sup>2</sup> .....	11.9	10.5	9.0	8.9	2.0	2.0	6.5	5.9
Average .....	10.2	11.8	9.2	8.9	1.9	2.4	6.2	6.0

<sup>1</sup> On Sept. 18, 1938, observations were made in inlet "B" and the following day in inlet "A".  
<sup>2</sup> On Sept. 22, 1940, observations were made in inlet "A". Two days later, a cool heavy rain lowered the temperature in both inlets; unfortunately only in inlet "B" was it possible to make observations.

probably sufficient for trout to discern between the two inlets during up-stream movements.

Powers (1939 and 1941) believes, that it is the carbon dioxide tension in the water, which determines the movements of the different species of *Oncorhynchus* during spawning migration. This explanation in the case of Grand Epaule trout is hardly applicable, as in both inlets there is practically the same amount of dissolved CO<sub>2</sub> (Table II). It is suggested that during the 1940 experiment, the fish were guided toward their respective streams principally by the temperature and the force of current of each inlet. Although, the last factor was not accurately measured, there is no doubt that the water in inlet "A" is slightly cooler (Table II) and the current stronger than in inlet "B". How fish can detect these differences, through the thickness of the lake's water, stretching for about half a mile between the wharf and each inlet, is not known.

In this connection may be recalled a noteworthy observation on the behaviour of speckled trout during spawning time given in a "Manual of fish-culture" (1900, p. 83): "After the spawning-ground is once selected it is hard to drive the fish away, the female especially returning to the same spot at the earliest opportunity. A female has been taken from her nest and marked and then returned to the water a mile down stream, and the next morning was again found on the same bed."

The spawning season for the speckled trout in the Laurentides Park is very early, within Grand Epaule being the last two weeks of September. The practice of handling many thousands of trout during the reproductive period made it possible to distinguish quite accurately between sexes and stages of maturity of tagged fish without dissecting them.

Tagged specimens were grouped into three categories: *spawning* (149 fish), *partially spent* (53 fish) and *spent* (17 fish). In addition there were 7 trout, whose sex or stage of maturity were undetermined. The recaptured fish were represented by 14 individuals (9.4%) in *spawning* stage and by 6 (11.3%) in *partially spent* category. Thus, during the experiment, trout of both sexes recaptured in either inlet were not only sexually mature,

but ready to spawn and some had even started to shed their reproductive elements. The individuals already spent did not return to the spawning grounds, nor did immature specimens go there.

This experiment indicates that, whatever factors lead speckled trout to resort to certain spawning grounds, they operate with surprising regularity in leading them back to the same grounds when they have been caught and removed to a considerable distance.<sup>4</sup> It is hoped that, some time in the near future, there will be another opportunity to complete the observations on the behaviour of Grand Epaule trout.

Thanks are due to Prof. J. R. Dymond, who kindly read over the manuscript and offered many valuable suggestions.

<sup>4</sup> For the information and bibliography on "homing instinct" in salmon see Ricker and Robertson (1935) and Scheer (1939).

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TABLE III. PHYSICO-CHEMICAL CONDITIONS OF LAKE GRAND EPAULE  
DURING SEPTEMBER, 1938-1940

Date	Temperature, °C.		O <sub>2</sub> , p.p.m.		CO <sub>2</sub> , p.p.m.		pH	
	S	8m.	S	8m.	S	8m.	S	8m.
Sept. 14, 1938 .....	12.2	10.2	8.7	7.0	2.0	5.0	6.1	5.8
Sept. 15, 1938 .....	13.0	10.2	8.5	7.6	1.5	2.5	6.0	5.9
Sept. 10, 1939 .....	14.0	13.1	8.1	7.8	2.0	3.0	6.1	6.1
Sept. 14, 1939 .....	13.0	12.6	8.7	8.6	2.0	2.5	6.1	6.1
Sept. 22, 1940 .....	14.0	12.5	9.0	7.4	2.0	5.0	6.3	6.0
Average .....	13.2	11.7	8.6	7.7	1.9	3.6	6.1	6.0

Remark: Water analyses were made from samples taken at the surface (S) and at a depth of 8 meters (8m.) or about 25 feet.

## NOTES AND OBSERVATIONS

STATUS OF THE PHILADELPHIA VIREO AT WINNIPEG.—The Philadelphia Vireo (*Vireosylva philadelphica*) is considered to be a bird of somewhat infrequent occurrence in Manitoba.\* The purpose of this note is to suggest that the species is more common in the Winnipeg district during migration than existing records indicate. The suggestion is based on the following list of occurrences observed at Deer Lodge, Winnipeg, eight of them by A. H. Shortt, one by T. M. Shortt and B. W. Cartwright, and the remainder by the writer:

1929. Autumn: Sept. 7, two seen (T.M.S. and B.W.C.); one collected by T.M.S.

1930. Spring: May 22, one seen.

1931. Spring: May 24, two, both singing; May 30, one; May 31, two; June 2, one; June 3, one; June 6, (A.H.S.).

Autumn: August 31 (A.H.S.); September 5 (A.H.S.).

1932. Spring: May 18, one; May 19, one; May 20 (A.H.S.); May 21, (A.H.S.); May 23, one; May 24, one; May 25, one; May 26, one; May 29, (A.H.S.); June 3, two.

Autumn: August 19, (A.H.S.); August 20, one; August 21, one; August 25, (A.H.S.); September 10, three together.

In some of the above records, the same bird probably noted on successive days. Nevertheless, it is clear that the species was a regular migrant through the area under observation. One specimen only was collected, but the writer has every confidence in the sight identifications. The distinguishing marks used were the yellow below,—always strongest on throat and upper breast,—definite face markings and dark bill. All the birds were tame, allowing close views to be had. One even permitted a sapling to be shaken violently one foot away from it, and finally moved only to avoid being actually struck.

The writer has found the species almost without exception in woods of medium-sized poplars (*Populus tremuloides*), with thick undergrowth of willows and red-osier dogwood. The vicinity of a water-filled ditch which ran through such growth was specially favored.

The birds noted in August appeared to be in worn plumage. Two of those seen on September 10, however, had apparently finished their molt, and were almost as yellow below as Nashville Warblers.

The alarm note of this species is a valuable clue to its identity. It consists of three, sometimes four, short, sharp notes uttered rapidly, thus: *paa - paa - paa*. Each note

has a downward inflection. The alarm note has been said to resemble that of the Warbling Vireo. Although they are similar in tone, the writer believes they should not be confused. That of the Warbling Vireo consists of a single, long, even note, *pa-aay*, less emphatic than the Philadelphia's.

While the alarm note may be compared with that of the Warbling Vireo, the song so closely resembles the Red-eyed Vireo's as to be hardly separable. Some authorities claim that it is a trifle higher in pitch than the latter's, and that it is repeated more slowly. The writer detected no difference in pitch. Although the interval between notes of the Philadelphia's song was usually 4 to 6 seconds, compared with 3 to 4 seconds for the Red-eyed's, Philadelphias were nevertheless several times heard singing as fast as the Red-eyed habitually does. The best point of distinction lies in the notes themselves. The Red-eyed's vocabulary is comparatively varied, and notes of three syllables occur commonly. The Philadelphia's song, on the other hand, is limited to a very few notes, and three syllable ones are uncommon. One rendition of the typical song in the writer's notes is *chu-ee - - che-way - - chu-ee*, etc. The first note rises by syllables, the second returns, the third rises again, and so on. Another song, interesting because it contains a three syllable note, was translated *see-wee - - see-wee-a - - see-wee*, etc.

One bird seen on August 21 was heard uttering a whisper song for a period of about 15 minutes, the total time the writer remained near it. The song differed little from its ordinary one, except in point of loudness.—R. D. HARRIS.

COLD STORAGE AS AN AID TO THE BUSY ORNITHOLOGIST.—It often happens, especially during a few days in the spring and fall migrations, that more specimens are available than can be prepared at the time. Sometimes birds are unfortunately killed at lighthouses in such numbers as to make it impossible to save them all without the use of cold storage. I well remember one such experience with birds killed at the Long Point Lighthouse in 1926, when I prepared sixty birds in two days to avoid losing them. Since that time, several experiments have been carried out, especially with small birds. The first trial used refrigeration below zero, with birds placed loosely in cardboard boxes. The results were very disappointing. The oils appeared to work through the feathers, destroying their fluffiness. The next year, birds were rolled in paper cylinders, placed in cardboard boxes which were tightly wrapped in paper and enclosed in a corrugated box in a meat room with temperature ranging from 12 to 14 degrees F. These made very much better skins than the birds frozen at lower temperatures.

\* Specimens now in the National Museum of Canada have been taken in Manitoba from Whitewater Lake, Shoal Lake, Riding Mountain, Swan River, The Pas, and Thicket Portage. At all points except Whitewater Lake this species probably has breeding status, though no nests have yet been found in the province.—F. A. Taverner.



Sparrows, after eight months, made perfect skins. Warblers were all right for three or four months, but with dry-skinned individuals the head skin dried to the skull causing difficulty in skinning. Shorebirds worked fine after eight months or more.

In recent years, some improvements have been made on this method. Shot holes are carefully taken care of and all blood stains removed. The birds are carefully smoothed out and rolled in wax paper cylinders. It improves the final result if the bird is in approximately the position desired at the time of freezing. These cylinders are placed in cardboard boxes which are, in turn, tightly wrapped in wax paper. The small boxes are packed in a cellophane-lined corrugated box with tight-fitting lid (a tin box with tight-fitting lid might be better). The chief drawback with cold storage is the drying out of specimens. Some shore birds and small land birds were skinned after two years in storage, but were dried too much about the head, wing joints and legs.

Cold storage is a great help to biologists, but should not be carried too far. The sooner specimens can be taken care of, the better. I try not to place badly shot specimens in storage, since the blood becomes thinned and soils the plumage badly. Small birds in storage a few months usually require about five minutes longer to skin. A suggestion for specimens which have to be held in storage for a longer period would be to wrap them as usual in wax paper, so they would not freeze together, place in a mason jar with a few ice cubes to retard evaporation, and seal tightly. Specimens placed near the ceiling of the refrigeration room, and as far as possible from the entrance door, appear to be least affected by changes of temperature.—A. A. WOOD.

**THE FLAMMULATED SCREECH OWL AT KAMLOOPS.**—This tiny species *Otus flammeolus* (Kaup), with its clouded plumage, dark eyes and naked toes, belongs to the south-western States and has only once been recorded from Canada, according to *Birds of Canada* by P. A. Taverner, 1935 ed. He quotes Brooks: "In November, 1902, I picked up a dilapidated specimen of this little owl on the beach at Penticton at the south end of Okanagan Lake. This is the only Canadian record." (Brooks, Allan. *British Columbia Supplement in Dawson, W. L. and Bowles, J. H., The Birds of Washington*, Vol. 2, 1909, pp. 965-978). So stood the record.

In the autumn of 1935, Mr. G. J. Spencer, entomologist at the University of British Columbia, gave me the unfinished skin of a small owl taken at Kamloops, B.C., on August 11, 1935. It showed no ears and was labelled "Pygmy Owl ♂?". The skin was carefully stored for remaking and was given no special study until some specimens of Vancouver Island Pygmy owls came to hand in the winter of 1939. By comparison it was obvious that the Kamloops bird was no Pygmy. Suspecting its identity, I showed it to Mr. Kenneth Racey, who immediately recognized it as the

Flammulated Screech Owl. This specimen consequently becomes the second record for Canada.

Kamloops is in the dry belt of the interior plateau of British Columbia, lying about one hundred miles north by west of Penticton. Mr. J. A. Munro suggests that this bird may have travelled north by the migration route through Princeton, Merritt and Nicola Lake. Other specimens may be expected in this region. The following account of the taking of this specimen by Professor Spencer is given below.

The Kamloops field station camp of the Federal Division of Entomology lies about eleven miles north of the city, half a mile beyond Lac du Bois, at an elevation of about 3100 feet. Every evening after supper until dusk my assistant Mr. Ivor Ward and I were in the habit of tramping the hills in all directions, collecting insects and observing wild life. Returning home late in the evening of 11th August, 1935, we were about a mile from camp, on the hills north of the road to Pass Lake, at an elevation of about 3400 feet and passing through an area of lodgepole pine and small Douglas fir, when a bird started to follow us, making the most remarkable sounds which ran the gamut from scolding, grumbles, throaty chuckles and interrogations, to high pitched squeaks. It rivalled an inquisitive raven at its best. This kept on for a couple of hundred yards, stopping when we stopped and continuing when we started again, but remaining behind us all the time. We tried our best to see the bird but it was too dark to locate it. Finally I decided that we ought to collect it, so we stayed quiet for a few minutes; it caught up to us and alighted in the tree beneath which we had becoming perceptible merely as a blotch against the darkening sky. Ivor Ward collected it with the .410 shot-gun and as soon as we returned to camp I made it into a temporary study skin, thinking it was a Pygmy owl. The bird had no parasites, on or in it.

Upon returning to the University in September, I gave the skin to Dr. Williams along with one or two others, in return for his kindnesses from time to time in collecting ectoparasites and in making up the odd bird skin for me. As soon as he was aware of its identity and of its unique position in the bird collections of Canada, he most generously offered to give me back the skin for the collections of the Department of Zoology, but I had presented it to him. Moreover, he has assured me that it will ultimately come to this University. In the meantime it remains in his personal collection.—M. Y. WILLIAMS and G. J. SPENCER.

**GREEN HERON ON MISSISSIPPI RIVER, LANARK COUNTY, ONTARIO.**—It is our custom to spend some of our leisure hours canoeing along a quiet six-mile stretch of the Mississippi River near Pakenham village in this north-east corner of the county. The river winds peacefully along through fertile farms and pleasant bits



of white pine, white cedar and mixed deciduous woods. In places the well-wooded shores rise rather steeply. Along the weedy banks grows a profusion of pickerel-weed, purple loosestrife, forget-me-not, arrow-head, and cardinal-flower. The abundance of frogs makes profitable feeding for Great Blue Herons.

In this pastoral environment, we have been seeing the Green Heron for four seasons. On being flushed from a low perch over the water, the birds always would fly low along the shore. The following dates of observation are recorded in my notes:

August 6th, 8th, 23rd, 1937

July 2nd, 7th, 31st, 1938

July 8th, September 4th, 1939

August 28th, September 4th, 1940..

The Green Heron was common during July, 1937, and during July and August, 1940.

During the week of August 3rd to 10th, 1941, we were camped on one of the rocky points along the river. Below us, broad steps of shelving rock led down the 8 feet to the water level. Some beaver, that were playing havoc with a grove of poplar on the opposite bank, had two well-marked trails down to the water. Their diving and splashing disturbed our rest for the first three nights in camp. Just at dark on the evening of August 6th, at least two Green Herons alighted on some trees just opposite us, and evidently remained there all night.

At 6.10 on the morning of August 8th, I was awakened by a measured, throaty call which I interpreted to be the "qu-ick", "qu-ick", note of the Green Heron. When I stepped from the tent, the bird flew from a cedar by the bank to another cedar over our supply tent. I walked along the bank about 30 feet and upon looking back toward the tent saw another adult heron about 15 feet from me and 10 feet up in a cedar tree and, perched on a prong of oak beside this tree, was a gawky young Green Heron, practically full grown, very brownish with yellowish skin about the eyes and beak. I was able to watch the Green Herons for 35 minutes; their apparent unconcern amazed me. For most of that time the young bird was employed at pruning his feathers with his long beak, repeatedly spreading out a wing to cover an outstretched leg and combing his crest with his claw.

The adult bird walked up and down the drooping limbs of the cedar, with much dipping of the tail and uttering many throaty notes. When the rays of the morning sun reached the young heron on his perch, he showed signs of taking off. He stretched his neck and bent forward until it seemed that he would overbalance. At the third attempt he succeeded and flew across the river, closely followed by the other two birds, where they settled in an ash, remaining thereabouts for 10 minutes. At 6.55 a.m. the young bird flew down river, followed by the other two, a single shriek announcing their departure.

Later in the season, on the afternoon of September 30th, when the maples and oaks

were showing considerable autumn colouring, we visited the camp site by motorboat and saw the Green Heron three times. Should we have an opportunity to visit the river in June, we should not be surprised to find a nest along one of the two sheltered creeks which empty into the river near our campsite.—EDNA G. ROSS.

**SUCKERS AND BULL-HEADS.**—Early in February, 1936, during a cold spell when the day temperature was 10 or 12 degrees below zero, my attention was called to an area of open water, measuring roughly 20 by 50 feet, at the outlet of the sewer from Ravenscourt school in Fort Garry, some five miles south of Winnipeg; this sewer emptied into the Red River and had prevented the water from freezing most of the winter. The depth of this water ranged from about one to three feet.

In this confined space I found hundreds of bull-heads, so crowded that they were unable to maintain a horizontal position, and the water was therefore dotted with the heads that broke the surface. The boys of the school with the aid of sticks threw hundreds on to the surface of the ice. Two boys told me that they alone had "rescued" 270 fish in a little over an hour. These bull-heads measured about eight or nine inches long.



We also took out other fish:—pike up to 5 lbs., perch of about ¼ lb., pickerel of about ½ lb., 4 lampreys, another fish believed to be a bowfin, and some 10 suckers each of about 3 or 4 lbs. in weight. The suckers were apparently the Common Sucker, *Catostomus commersonnii*.

Two of the suckers had almost completely swallowed a bull-head, one of which I laid on the snow and photographed. The sucker still moved after twenty minutes on the snow in sub-zero temperature. These bull-heads were

so tightly wedged that it was impossible to move them at all in either direction; the lips grasped the narrow part of the bull-head's body just in front of the caudal fin.

How the entry was effected is not easy to explain, as suckers are not known to eat other fishes. The most likely explanation would seem to be that the bull-heads accidentally entered the mouths of the suckers while the latter were gasping from suffocation. All the fishes appeared to be on the verge of exhaustion probably due to lack of oxygen, poison from sewer gases and crowding.—L. T. S. NORRIS-ELYE.

SOME ADDITIONS TO THE VERTEBRATE FAUNA OF DARLINGTON TOWNSHIP, DURHAM COUNTY, ONTARIO.—Although it is only two years since we published our brochure on the vertebrates of this township (The Vertebrate Fauna of Darlington Township, Durham County, Ontario, *Trans. Roy. Can. Inst.* No. 40, 23: 83-118, 1940), it is already possible to add several species of birds to those listed and to note changes in status of other birds, as well as some of the mammals. The original paper listed 206\* species of birds, for 69 of which there were known breeding records; 32 mammals, 13 amphibians, 8 reptiles and 45 fishes were also noted in that paper. We now can add 5 additional species of birds and 2 breeding records to bring the list to 211 species which occur in the area under consideration; 71 of these have been found breeding.

*Lutra canadensis canadensis* (Schreber). CANADA OTTER.—*The Canadian Statesmen* of May 8, 1941, "In the Dim and Distant Past" quotes its files for May 13, 1891, as follows: "W. H. Osborne, farmer living a mile east of town (Bowmanville) killed a fine specimen of Canadian otter in the woods. It measured 3 feet and weighed 13 pounds."

*Odocoileus virginianus borealis* (Miller). NORTHERN WHITE-TAILED DEER.—In the original article I had no recent record for the township. *The Canadian Statesman* of July 31, 1941, recorded "that Mrs. Norman Woodley, Tyrone, had just seen a doe disporting herself in a nearby pasturefield". This was on July 24, 1941.

*Vulpes fulva* (Desmarest). RED FOX.—During the winter 1941-42 the Red Fox was very common throughout this area as well as in other parts of Southern Ontario.

*Butorides virescens*. GREEN HERON.—Forest Dilling found young birds in the nest on June 19, 1940, to add this species to the breeding list for Darlington township.

*Ixobrychus exilis*. LEAST BITTERN.—This species may occur more commonly than I previously indicated. I observed two in the First Marsh on May 30, 1940, and Mr. Dilling caught and banded an immature bird in the Marsh on August 15, 1941, to add this species to those known to breed in the township.

*Querquedula discors*. BLUE-WINGED TEAL.—This duck appears to be increasing in summer abundance. Four were seen on May 27, 1940, in the stream and marshes near the lake, and three more were observed on May 30. A pair of Mallards (*Anas platyrhynchos*) were seen in the same area on the former date. It might be a fair assumption to presume both species were nesting.

*Nyroca collaris*. RING-NECKED DUCK.—It now appears from further study that the small "Bluebills" which occasionally frequent Hampton Pond in the fall, singly or in very small flocks, are Ring-necked Ducks.

*Nyroca affinis*. LESSER SCAUP DUCK.—One was observed at close range on the Second Marsh, May 27, 1940, and about a dozen were seen on the Lake.

*Aquila chrysaetos*. GOLDEN EAGLE.—An immature Golden Eagle was shot at Bowmanville Beach, October 24, 1941, and displayed in a local store for some time subsequently.

*Fulica americana*. AMERICAN COOT.—A single specimen was observed on the Second Marsh on May 27, 1940.

*Arenaria interpres*. COMMON TURNSTONE.—Although previously considered an uncommon migrant and overlooked in my earlier studies, I found it commonly along the beach on May 27, 1940.

*Stelgidopteryx ruficollis*. AMERICAN ROUGH-WINGED SWALLOW.—Several of these birds, uncommon in Darlington, were observed along Barbers' Creek, May 28, 1940.

*Petrochelidon albifrons*. CLIFF SWALLOW.—There is a suggestion this bird is becoming rarer in Southern Ontario. In this connection it is of interest to note that at least two of the colonies formerly present near Hampton were deserted in 1940.

*Cistothorus stellaris*. SHORT-BILLED MARSH WREN.—On May 30, 1940, we were able to add this species to the township fauna when several were noted in an open grassy area at the head of the First Marsh.

*Dumetella carolinensis*. CATBIRD.—Previously recorded as nesting throughout the township, no specific record was included. On May 30, 1940, a nest of this species containing one egg was found six feet from the ground in a small white cedar at Bowmanville Beach.

*Sturnus vulgaris*. COMMON STARLING.—I had previously reported that I suspected this species first nested in the township in 1926. Mr. J. L. Baillie Jr. now confirms this suspicion. He tells me that Mr. R. S. Dingman found a nest containing young at Darlington "village" in a knot-hole in a farmer's barn on July 24, 1926.

*Guiraca caerulea*. BLUE GROSBEAK.—On May 26, 1923, one was seen at Bowmanville by Ralph H. Carruthers as recorded by J. L. Baillie Jr., "In Birdland", *Toronto Evening Telegram*, November 23, 1940.

*Spizella pallida*. CLAY-COLORED SPARROW.—One of these western sparrows was caught and banded by Mr. Dilling in Bowmanville, May 7, 1941. It must be considered an accidental visitor.—A. E. ALLIN.

\* Erroneously reported as 171 when reviewed in this Journal by C.H.D.C. (*Can. Field-Nat.* 55: 9, 1941.)

## INDEX TO VOLUME LVI

## A

- About Ourselves, by James G. Needham, review by A. W. A. B. .... 24
- Acanthis hornemannii* ..... 54
- Actinaria* ..... 54
- Acanthoscapites nodosus* ..... 4
- Accipiter cooperi* ..... 24, 72
- velox* ..... 24, 72
- Acmaea* ..... 115, 117
- Acris crepitans* ..... 16
- Actitis macularia* ..... 37, 74, 131
- Aequorea* ..... 118
- Agelaius phoeniceus* ..... 53, 79
- Aiz sponsa* ..... 22
- Alca torda* ..... 7
- Allin, A. E.  
Bats Hibernating in the District of Thunder Bay, Ontario ..... 90
- Some Additions to the Vertebrate Fauna of Darlington Township, Durham County, Ontario ..... 140
- Alopec lagopus ungava* ..... 6
- A Lot of Insects, by Frank E. Lutz, review by A. W. A. B. .... 44
- Alsatispis bakeri* ..... 33
- evansi* n. sp. .... 33
- Alsatispis* in Newfoundland, by Cecil Kindle ..... 33
- American Plant Names, by Willard N. Clute, review by A. E. P. .... 62
- Ambystoma decortatum* ..... 15
- gracile* ..... 15
- jeffersonianum* ..... 15
- macroductylum* ..... 15
- maculatum* ..... 15
- tigrinum diaboli* ..... 15
- tigrinum slateri* ..... 15
- tigrinum tigrinum* ..... 15
- Amphibians and Reptiles of Canada, by E. B. S. Logier and G. C. Toner ..... 15
- Amyda spinifera spinifera* ..... 16
- Anas platyrhynchos* ..... 21, 140
- rubripes* ..... 21, 71
- Anderson, R. M.  
Canadian Voles of the Genus *Phenacomys* with Description of two new Canadian Subspecies ..... 56
- Aneides ferresii* ..... 15
- Anisulabis annulipes* ..... 3
- Annual Report of the Forest Insect Survey 1940 ..... 12
- Anser albifrons gambeli* ..... 121
- frontalis* ..... 121
- Anthus spinoletta* ..... 50, 78
- Antrostomus vociferus* ..... 39, 75
- Aquila chrysaetos* ..... 24, 140
- Arcestes* ..... 99
- Archilochus colubris* ..... 39, 75
- Arcomytillus* ..... 103
- Ardea herodias* ..... 10, 71, 131
- Arenaria interpres* ..... 36, 140
- Arenicola* ..... 116
- Asaphus truei* ..... 15
- Asio flammeus* ..... 39
- wilsonianus* ..... 39
- Astarte* ..... 99
- Astur atricapillus* ..... 23, 72
- Attention Herpetologists, by E. B. S. Logier and G. C. Toner ..... 126
- Auk, Razor-billed ..... 5, 6, 7
- Aurelia* ..... 118
- aurita* ..... 118
- Avicula gryphaeata* ..... 100
- B**
- Backyard Beaver, A, by Clyde L. Patch ..... 46
- Baculites compressus* ..... 4
- Baird, Spencer Fullerton, Bernard Rogan Ross to ..... 120
- Baldpate ..... 22, 28, 30
- Banding Provides Age Record for Atlantic Murre, by T. S. Hennessy ..... 122
- Bankia* ..... 117
- Bartramia longicauda* ..... 36
- Bat, Big Brown ..... 91
- Hoary ..... 92
- Little Brown ..... 91
- Long-Eared Brown ..... 91
- Bats Hibernating in the District of Thunder Bay, Ontario, by A. E. Allin ..... 90
- Beall, Geoffrey  
Mass Movement of the Wasp ..... 64
- Beamer, L. H.  
The Buckeye Butterfly (*Junonia coenia* Hubn.) in Ontario ..... 113
- Bear, Black ..... 92
- Beaver, A Census in Algonquin Provincial Park, 1939-1940, by Donald L. Robb ..... 86
- Birds of Leeds County, Ontario, by G. C. Toner, W. E. Edwards and Murray W. Curtis ..... 8, 21, 34, 50
- Bittern, American ..... 11, 71
- Least ..... 11, 140
- Blackbird, Brewer's ..... 30
- Crow ..... 80, 133
- Red-Winged ..... 27, 28, 53, 79
- Rusty ..... 29, 53, 80
- Bluebird ..... 44
- Red-Breasted ..... 78, 133
- Boa, Rubber ..... 16
- Bobcat ..... 92
- Bobolink ..... 52, 79
- Bob-White ..... 29
- Bolinopsis* ..... 118
- Bombicilla cedrorum* 50, 78, 133
- garulla* ..... 50
- Bonasa umbellus* ..... 35, 73, 131
- Botaurus lentiginosus* ..... 11, 71
- Brant ..... 12
- Branta bernicla* ..... 12
- Black ..... 30
- canadensis* ..... 11, 71
- Bubo virginianus* ..... 38, 74
- Buckeye Butterfly (*Junonia coenia* Hubn.) in Ontario, The, by L. H. Beamer ..... 113
- Bufflehead ..... 23, 27, 28, 29, 30
- Bufo americanus* ..... 93
- americanus americanus* ..... 15
- americanus copei* ..... 15
- boreas boreas* ..... 15
- cognatus* ..... 15
- fowleri* ..... 15
- hemiphysus* ..... 15
- Bullfrog ..... 16, 93
- Bull-heads, Suckers and, by L. T. S. Norris-Elye ..... 139
- Bunting, Indigo ..... 53, 80
- Snow ..... 26, 27, 28, 29, 55, 81
- Buteo borealis* ..... 24, 72
- lineatus* ..... 24
- platypterus* ..... 24, 72, 131
- Butorides virescens* ..... 11, 140
- Butterflies, by Ralph W. Macy and Harold H. Shennard, review by A. W. A. B. 12
- C**
- Calcaricus lapponicus* ..... 55
- Callinassa californensis* ..... 116
- Calliostoma costatum* ..... 116
- Canachites canadensis* 35, 73, 131
- Canadian Conservation Association, Editorial ..... 47
- Canis latrans* ..... 92
- lycaon* ..... 92
- Canvassack ..... 22, 28, 29, 30
- Capella delicata* ..... 36, 74, 131
- Cardinal ..... 27, 28, 29, 30
- Caretta caretta* ..... 16
- Carex elynoides* ..... 112
- nardina* ..... 112
- Caribou ..... 93
- Carpodacus purpureus* ..... 54, 80
- Cartwright B. W.  
Red-Bellied Woodpecker in Manitoba ..... 45
- Casmerodius albus* ..... 10
- Cassionella beyrichi* ..... 99, 100
- beyrichi* var. *crickmayi* n. var. .... 99, 103
- tectiformis* ..... 100
- verbeeki* ..... 100
- Cassidulus taylori* ..... 4
- Catastomus commersonii* ..... 139
- Catbird ..... 43, 77, 150
- Celtis* ..... 130
- occidentalis* ..... 130
- Census, Christmas Bird, 1941 ..... 26
- Centurus carolinus* ..... 45
- Cephus grylle grylle* ..... 7
- Certhia familiaris* ..... 43, 77, 133
- Chaetura pelagica* ..... 39, 75
- Char, Arctic ..... 123
- Dolly Varden ..... 110, 111, 112
- Charadrius melodus* ..... 36
- Charina bottae* ..... 16
- Charitonetta albeola* ..... 23
- Chat, The Long-tailed, in Saskatchewan, by J. Dewey Soper ..... 83
- Chauleasmus streperus* ..... 21
- Chelydra serpentina* ..... 16, 93
- Chen caerulescens* ..... 11, 71
- hyperborea* ..... 121
- rossi* ..... 121
- Chickadee, Acadian ..... 26
- Black-capped ..... 26, 27, 28, 29, 30, 42, 77, 133
- Brown-headed ..... 26, 27, 42, 133
- Chestnut-backed ..... 30
- Oregon ..... 30
- Chipmunk, Eastern ..... 92
- Chitty, Dennis and Helen Chitty, The Snowshoe Rabbit Enquiry, 1939-40 ..... 17
- Chlidonias nigra* ..... 37, 74
- Chordeiles minor* ..... 39, 75, 132
- Choristoceras* ..... 99
- Christmas Bird Census, 1941 ..... 26
- Chryssemys bellii* ..... 93
- bellii bellii* ..... 16
- bellii marginata* ..... 16
- picta picta* ..... 16
- Circus hudsonius* ..... 34, 72
- Cistothorus stellaris* ..... 43, 140
- Clanula hiemalis* ..... 23
- Clarke, C. H. D.  
Bernard Rogan Ross to Spencer Fullerton Baird, Cougar in Saskatchewan The Indian as Conservationist ..... 127
- clavellatae* ..... 100
- Clemmys guttata* ..... 16
- insculpta* ..... 16
- marmorata* ..... 16
- Clench, W. J.  
Johnsonia, review by John Oughton ..... 12
- Clute, Willard N.  
American Plant Names, review by A. E. P. .... 62
- Coc-a-wee ..... 121
- Coccyzus americanus* ..... 38, 132
- erythrophthalmus* ..... 38, 74
- Coepheus pileatus* ..... 40, 75
- Colaptes auratus* ..... 40, 75, 132
- Cold Storage as an Aid to the Busv Ornithologist, by A. A. Wood ..... 137
- Collecting of Marine Zoological Material in British Columbia Waters, The, by C. McLean Fraser ..... 115
- Coluber constrictor constrictor* ..... 16
- constrictor flaviventris* ..... 16
- constrictor mormon* ..... 16
- Colymbus auritus* ..... 10, 70
- griseaena* ..... 10
- Compsothlypis americana* ..... 51
- Conservationist, The Indian as, by C. H. D. Clarke ..... 127
- Coot, American ..... 30, 36, 73, 190, 140
- Cormorant, Double-crested ..... 5, 6, 10, 71
- European ..... 5, 6
- Pelagic ..... 30
- Violet-green ..... 30
- White-crested ..... 30

- Corthylio calendula* ..... 44  
*Corvus brachyrhynchos* ..... 42, 77, 133  
*corax* ..... 42, 77  
*costatae* ..... 100  
*Costatoria* ..... 100  
Cougar in Saskatchewan, by  
C. H. D. Clarke ..... 45  
Cowbird ..... 53, 80  
Crane, Sandhill ..... 35, 73, 122  
Whooping ..... 122  
Creeper, Brown  
26, 27, 28, 29, 30, 43, 77, 133  
*Cristivomer namaycush* ..... 129  
Crossbill, Red ..... 54  
White-winged ..... 26, 28, 30, 54  
*Crotalus horridus horridus* ..... 16  
*viridis oregonus* ..... 16  
*viridis viridis* ..... 16  
Crow, American  
27, 42, 77, 121, 133  
Eastern ..... 26, 27, 28, 29, 30  
North-western ..... 30  
Western ..... 30  
*Cryptoglaux acadia* ..... 39  
Cuckoo, Black-billed ..... 38, 74, 132  
Yellow-billed ..... 38, 132  
Curtis, Murray W. G. C.  
Toner and W. E. Edwards  
Birds of Leeds County,  
Ontario ..... 8, 21, 34, 50  
*Cyanca capillata* ..... 118  
*Cyanocitta cristata* ..... 42, 77, 132  
*Cygnus columbianus* ..... 11
- D**  
*Dafila acuta* ..... 22  
*Danaus archippus* ..... 64, 66, 67  
Deer, Northern White-tailed ..... 140  
Virginia ..... 93  
*Dendroica aestiva* ..... 51, 78  
*caerulea* ..... 51, 79  
*castanea* ..... 52, 133  
*cerulea* ..... 52  
*coronata* ..... 51, 79, 133  
*fusca* ..... 52  
*magnolia* ..... 51, 79, 133  
*nigrescens* ..... 52  
*pensylvanica* ..... 52, 79  
*pinus* ..... 52  
*striata* ..... 52  
*tigrina* ..... 51  
*virens* ..... 79  
Dermaptera of Ontario,  
The, by F. A. Urquhart ..... 3  
*Dermochelys coriacea* ..... 16  
*schlegelii* ..... 16  
*Desmognathus fuscus fuscus* ..... 15  
*ochrophaeus ochrophaeus* ..... 15  
*Diadophis punctatus edwardsii* ..... 16  
*Diadora aspera* ..... 115  
*Dicamptodon ensatus* ..... 15  
*Didymograptus bifidus* ..... 33  
*caduceus* ..... 33  
*Dina fervida* ..... 68  
*Diphylites* ..... 99  
*Dolichonyx oryzivorus* ..... 52, 79  
Dolly Varden Char in Salt  
Water Off British Colum-  
bia, The Occurrence of, by  
J. R. Dymond ..... 110  
*Doru aculeatum* ..... 3  
*aculeatum aculeatum* ..... 3  
*lineare* ..... 3  
Downs, Andrew, An Appre-  
ciation, by Virginia Tufts ..... 81  
Dove, Rock ..... 27, 28, 29, 30  
Mourning ..... 27, 29, 38, 74  
*Dryas Drummondii* ..... 112  
*Drummondii* var. *tomen-  
tosa* n. comb. .... 112  
*integrifolia* ..... 113  
*octopetala* ..... 112  
*tomentosa* ..... 112  
*Dryobates pubescens* ..... 40, 76  
*villosus* ..... 40, 75, 132  
Duck, Black  
5, 6, 21, 26, 27, 28, 29, 71  
Harlequin ..... 30  
Ring-necked ..... 22, 27, 28, 29, 140  
Wood ..... 22  
*Dumetella carolinensis* ..... 43, 77, 140  
Dymond, J. R.  
The Occurrence of the
- Dolly Varden Char in  
Salt Water Off British  
Columbia ..... 110
- E**  
Eagle, Bald ..... 29, 30, 34, 72  
Golden ..... 24, 140  
Earwig ..... 3  
Ebersen, Frederick  
The Microbe's Challenge,  
review by C. K. J. .... 25  
*Echinarachnias* ..... 116  
*Ectopistes migratorius* ..... 38  
Editorial  
Canadian Conservation  
Association ..... 47  
The New Systematics ..... 63  
Edwards, W. E., G. C.  
Toner and Murray W.  
Curtis  
Birds of Leeds County,  
Ontario ..... 8, 21, 34, 50  
Egret, American ..... 10  
Elder, King ..... 23  
Pacific ..... 122  
Southern ..... 5, 6  
*Elaphe obsoleta obsoleta* ..... 16  
*vulpina gloydii* ..... 16  
*Elegantes* ..... 100  
*Elegantinia* ..... 100  
Elton, Charles  
Voles, Mice and Lem-  
mings, Problems in Popu-  
lation Dynamics, review  
by J. R. D. .... 82  
*Empidonax* ..... 132  
*minimus* ..... 41, 76  
*traillii* ..... 41  
*Emys blandingii* ..... 16  
*Enantiostrongylus* ..... 99  
*Ensatina eschscholtzii* ..... 15  
*Eptesicus fuscus fuscus* ..... 91  
*Erethizon dorsatum* ..... 92  
*Eriophorum opacum* ..... 112  
*opacum* var. *cinnamomeum*  
n. var. .... 112  
*spissum* ..... 112  
*spissum erubescens* ..... 112  
Essig, E. O.  
College Entomology, re-  
view of ..... 141  
*Euarctos americanus* ..... 92  
*Eudistylia* ..... 117  
*Eumeces fasciatus* ..... 16  
*septentrionalis, septen-  
trionalis* ..... 16  
*skiltonianus skiltonianus* ..... 16  
*Euphagus carolinus* ..... 53, 80  
*Eurycea bislineata bisline-  
ata* ..... 15  
*bislineata major* ..... 15  
*Eutrepheceras deKayi* ..... 4  
*Evasterias troschelii* ..... 117
- F**  
*Falco columbarius* ..... 73  
*peregrinus* ..... 34, 73  
*rusticolus* ..... 73  
*sparverius* ..... 35, 73, 131  
Falcon, Peregrine ..... 73  
*Felis concolor* ..... 45  
Felt, Ephraim Porter  
Plant Galls and Gall  
Makers, review by A. W.  
A. B. .... 62  
Ferns of Nova Scotia, The,  
by A. E. Roland, review  
by H. A. S. .... 44  
Financial Standing, Ottawa  
Field-Naturalists' Club,  
Statement of ..... 14  
Finch, Common Purple  
26, 28, 54, 80  
Fish of the Eastern Cana-  
dian Arctic, Notes on  
Some, by T. H. Manning ..... 128  
*Flabellatae* ..... 100  
Flammulated Screech Owl  
at Kamloops, The, by M.  
Y. Williams and G. J.  
Spencer ..... 138  
Flicker, Hybrid ..... 122  
Northwestern Red-shafted  
Yellow-shafted  
26, 28, 29, 40, 75, 132  
Flycatcher, Crested ..... 40, 76
- Empidonax ..... 132  
Least ..... 41, 76  
Olive-sided ..... 132  
Traill's ..... 41  
Forest Insect Survey, An-  
nual Report of the, re-  
view of ..... 12  
*Forficula auricularia* ..... 3  
Fox, Red ..... 92, 140  
White ..... 6  
Fraser, C. McLean  
The Collecting of Marine  
Zoological Material in Bri-  
tish Columbia Waters ..... 115  
Fraser, W. P.  
Notes on the Willows of  
Saskatchewan ..... 104  
*Fratercula arctica arctica* ..... 7  
*Fraxinus* ..... 9  
Frog, Cricket ..... 16  
Green ..... 16  
Leopard ..... 16, 93  
Mink ..... 16  
Northern Swamp Tree ..... 16  
Northern Wood ..... 16  
Oregon Red-legged ..... 16  
Pacific Tree ..... 16  
Pickerel ..... 16  
Swamp Tree ..... 16  
Western Spotted ..... 16  
Western Wood ..... 16  
Wood ..... 16  
*Fucus* ..... 116  
*Fulica americana* ..... 36, 73, 140
- G**  
Gadwall ..... 21  
*Gallinula chloropus* ..... 36  
Gallinule, Florida ..... 36  
Gannet ..... 10  
Garter-snake ..... 93  
Butler's ..... 16  
Eastern ..... 16  
Gray ..... 16  
Plains ..... 16  
Puget ..... 16  
Red-barred ..... 16  
Red-spotted ..... 16  
*Gavia immer* ..... 9, 70, 131  
*Geothlypis trichas* ..... 52, 79  
*Gerrhonotus coeruleus prin-  
cipis* ..... 16  
*Glaucionetta clangula* ..... 23, 71, 131  
*Glossiphonia complanata* ..... 68, 70  
*stagnalis* ..... 68  
Golden-eye, American  
23, 26, 27, 28, 29, 30  
Barrow's ..... 30  
Common ..... 71, 131  
Goldfinch, American ..... 27, 54, 80  
Eastern ..... 26, 27, 28, 29  
*Goniomemus vertens* ..... 116  
Goodwill, E. V.  
The Summer Birds of the  
Madsen Area, Patricia  
District, Ontario ..... 113  
Goose, Blue ..... 11, 71  
Canada ..... 11, 29, 71  
Ross's ..... 120, 122  
Snow ..... 122  
White-fronted ..... 122  
Goshawk, American ..... 23, 26, 72  
Grackle ..... 53, 80  
Bronzed ..... 29  
*Graptomys geographica* ..... 16  
Grayling, Arctic ..... 120  
Grebe, Holboell's ..... 10, 29, 30  
Horned ..... 10, 27, 28, 30, 70  
Pied-billed ..... 10, 30, 71  
Western ..... 30  
Green Heron on Mississippi  
River, Lanark County,  
Ontario, by E. G. Ross ..... 138  
Groh, H.  
Hackberry in the Ottawa  
District ..... 130  
Grosbeak, Blue ..... 140  
Evening ..... 26, 27, 28, 29, 30, 53  
Pine ..... 26, 27, 28, 29, 30, 54  
Rose-breasted ..... 53  
Grouse, Ruffed  
26, 27, 28, 29, 30, 35, 73, 131  
Sharp-tailed ..... 30  
Spruce ..... 35, 73, 131  
*Gruenewaldia* ..... 100  
*Gruenewaldia* ..... 100

<i>Grus americana</i> .....	122
<i>canadensis</i> .....	35, 73, 122
Guillemot, Black .....	5, 6, 7
Pigeon .....	30
<i>Guiraca caerulea</i> .....	140
Gull, Bonaparte's .....	37
Glaucous .....	28, 29, 30
Great Black-backed .....	5, 6, 7, 26, 27, 28, 37
Herring .....	5, 6, 26, 27, 28, 29, 30, 37, 74, 131
Iceland .....	26
Ring-billed .....	5, 6, 28, 29, 37, 74
Short-billed .....	30
Thayer's .....	30
Gyr Falcon .....	73

## II

Hackberry .....	130
Hackberry in the Ottawa District, by Herbert Groh .....	130
<i>Haemopus marmoratus</i> .....	68, 69, 70
<i>Haliaeetus leucocephalus</i> .....	34, 72
<i>Haminoea vesicula</i> .....	116
Hare, Varying .....	92
Harlow, William S. .....	92
Trees of the Eastern United States and Canada, review by A. W. A. B. ..	82
Harris, R. D. .....	
Status of the Philadelphia Vireo at Winnipeg .....	137
Hawk, American Rough-legged .....	6, 28, 29
American Sparrow .....	35, 73, 131
Broad-winged .....	24, 72, 131
Cooper's .....	24, 28, 29, 72
Duck .....	34
Eastern Sparrow .....	28, 34
Marsh .....	28, 29, 34, 72
Pigeon .....	73
Red-shouldered .....	24, 28
Red-tailed .....	24, 27, 28, 29, 72
Sharp-shinned .....	24, 27, 28, 29, 72
<i>Hedmeles ludovicianus</i> .....	53
<i>Hemiaster humphreysianus</i> ..	4
<i>Hemidactylum scutatum</i> ..	15
Hennesy, T. S. .....	
Banding Provides Age Record for Atlantic Murre .....	122
<i>Hermisenda crassicornis</i> ..	116
Heron, Black-crowned .....	
Night .....	11, 71
Great Blue .....	10, 29, 71, 131
Green .....	11, 138, 139, 140
Northwest Coast .....	30
<i>Herpobdella punctata</i> .....	67, 68
<i>Hesperiphona vespertina</i> ..	53
<i>Heterodon contortrix</i> .....	16
<i>nasicus</i> .....	16
<i>Hirudinea</i> .....	67
<i>Hirundo erythrogaster</i> .....	41, 76
History, Range and Home Life of the Northern Bison, by J. Dewey Soper, review by C. H. D. C. ..	94
<i>Hoernesia bhavoui</i> .....	100
Hummingbird, Ruby-throated ..	39, 75
Hybrid, Flicker at Chatham, Ontario, by A. A. Wood .....	122
<i>Hydroprogne caspia</i> .....	74
<i>Hyla crucifer</i> .....	16
<i>regilla</i> .....	16
<i>versicolor versicolor</i> .....	16, 93
<i>Hylocichla fuscescens</i> .....	44, 78, 133
<i>guttata</i> .....	44, 78, 133
<i>ustulata</i> .....	43
<i>ustulata</i> .....	44

## I

<i>Icteria virens longicauda</i> ..	83
<i>Icterus galbula</i> .....	53, 79
<i>spurius</i> .....	53
<i>Incisalia nippon clarki</i> ..	12
Inconnu .....	121
Indian as Conservationist, The, by C. H. D. Clarke ..	127
<i>Inoceramus nebrascensis</i> ..	4
<i>Iridoprocne bicolor</i> .....	41, 76, 132
<i>Isobrychus exilis</i> .....	11, 140

## J

Jay, Blue .....	26, 27, 28, 29, 30, 42, 77, 132
-----------------	---------------------------------

Canada .....	26, 27, 28, 29, 30, 42, 77, 132
Steller's .....	30
Johnsonia, by W. J. Clench, review by John Oughton ..	12
<i>Junco hyemalis</i> .....	54, 80, 133
Junco, Slate-colored .....	26, 27, 28, 29, 54, 80, 133
Oregon .....	30
<i>Juniperus virginiana</i> .....	9
<i>Junonia coenia</i> .....	113

## K

Killdeer .....	28, 30, 36, 73
Kingbird .....	40
Eastern .....	76
Kindle, Cecil .....	
<i>Alscatspis</i> in Newfoundland .....	33
Kindle, Edward Martin, obituary of, by Alice E. Wilson .....	31
Kingfisher, Belted .....	28, 39, 75, 132
Kinglet, Golden-crowned .....	27, 28, 29, 30, 44, 78
Ruby-crowned .....	30, 44
Kittiwake, Atlantic .....	5, 6

## L

<i>Labia minor</i> .....	3
Ladies' Tresses, Hooded ..	1
Nodding .....	1
Spring .....	1
<i>Lagopus lagopus</i> .....	6
<i>Lampromptis triangulum triangulum</i> .....	16
<i>Lanius borealis</i> .....	50
<i>ludovicianus</i> .....	50, 78
Lark, Horned .....	29, 41, 76
Prairie Horned .....	29
<i>Larus</i> .....	123
<i>argentatus</i> .....	37, 74, 131
<i>argentatus smithsonianus</i> ..	123, 126
<i>argentatus thayeri</i> .....	123, 126
<i>argentatus vagae</i> .....	123
<i>barrovianus</i> .....	123, 124, 126
<i>delawarensis</i> .....	37, 74
<i>glaucescens</i> .....	123
<i>hyperboreus</i> .....	123, 124, 126
<i>hyperboreus barrovianus</i> ..	126
<i>hyperboreus hyperboreus</i> ..	126
<i>kumlieni</i> .....	123, 124, 126
<i>Larus kumlieni</i> and its Allies, by A. L. Rand .....	123
<i>Larus leucopterus</i> .....	123, 124, 126
<i>leucopterus X hyperboreus</i> ..	124
<i>leucopterus kumlieni</i> .....	126
<i>leucopterus leucopterus</i> .....	126
<i>leucopterus nelsoni</i> .....	126
<i>marinus</i> .....	6, 37
<i>nelsoni</i> .....	123, 126
<i>philadelphia</i> .....	37
<i>smithsonianus</i> .....	123, 124, 126
<i>thayeri</i> .....	123, 124, 126
Leeches, Observations on the Migratory Behaviour of, by L. R. Richardson ..	67
Leith, E. .....	
A Sea Urchin from the Cretaceous in Manitoba ..	4
<i>Lepus americanus</i> .....	17, 92
Lewis, Harrison F. .....	
Fourth Census of Non-Passerine Birds in the Bird Sanctuaries of the North Shore of the Gulf of St. Lawrence .....	5
<i>Ligyda pallasi</i> .....	115
<i>Lima</i> .....	99
<i>Limnoria</i> .....	117
<i>Lingula quebecensis</i> .....	33
Linnet, Redpoll .....	27, 54
<i>Listera australis</i> .....	2
Lizard, Douglass's Horned ..	16
Northern Plated .....	16
Lloyd, Wilnot .....	
H. C. Miller .....	130
Logier, E. B. S. and G. C. Toner .....	
Amphibians and Reptiles of Canada .....	15
Attention Herpetologists ..	126
Longspur, Lapland .....	28, 29, 55
Loon, Common .....	9, 27, 28, 29, 30, 70, 131

Pacific .....	30
Red-throated .....	5, 6, 30
<i>Lophodytes cucullatus</i> .....	23, 71
<i>Lovenia</i> .....	119
<i>Loxia curvirostra</i> .....	54
<i>leucoptera</i> .....	54
<i>Luidia</i> .....	119
<i>Lutra canadensis</i> .....	92
<i>canadensis canadensis</i> ..	140
Lutz, Frank E. .....	
A Lot of Insects, review by A. W. A. B. .....	44
<i>Lynx canadensis</i> .....	92

## M

Mack, H. G. .....	
Observations on the Raising of Waterfowl in Southern Ontario .....	48
<i>Macoma secta</i> .....	116
<i>Macrobella decora</i> .....	68
<i>Macrodon (Catella?) latyclava</i> .....	99
<i>tyaughtonae</i> n. sp. .....	99, 103
Macy, Ralph W. and Harold H. Shepard .....	
Butterflies, review by A. W. A. B. .....	12
Magpie .....	30
Mallard .....	21, 28, 29, 30, 140
Manning, T. H. .....	
Notes on Some Fish of the Eastern Canadian Arctic .....	128
<i>Mareca americana</i> .....	22
<i>Marmota monax</i> .....	92
Martin, G. W. .....	
Outline of the Fungi, review by J. W. G. .....	62
Martin, Purple .....	42, 77
Massasauga .....	16
Mass Movement of the Wasp, by Geoffrey Beall ..	64
McLearn, F. H. .....	
The Neo-Triassic <i>Cassianella</i> Fauna of Tyaughton Creek Valley, B.C. ..	99
Meadowlark .....	29, 53, 79
<i>Megaceryle alcyon</i> .....	39, 75, 132
<i>Melanerpes erythrocephalus</i> .....	40, 75
<i>Melanitta deglandi</i> .....	23, 71
<i>Melibe gleonina</i> .....	116
<i>Melospiza georgiana</i> .....	55, 133
<i>melodia</i> .....	55, 81, 132
<i>Mephitis mephitis</i> .....	92
Merganser, American Common .....	23, 26, 27, 28, 29, 30, 71
Hooded .....	23, 28, 30, 71
Red-breasted .....	5, 6, 23, 27, 29, 30, 72
<i>Mergus merganser serrator</i> .....	23, 71
<i>Mesochaetopterus</i> .....	116
<i>Mibora minima</i> .....	112
Microbe's Challenge, The, by Frederick Ebersson, review by C. K. J. .....	24
Miller, H. C. .....	
Obituary Notice, by Wilnot Lloyd .....	130
<i>Mimus polyglottos</i> .....	43
Mink .....	92
Miscellaneous Contributions from the National Herbarium of Canada, III, by A. E. Forsild .....	112
<i>Mniotilta varia</i> .....	51, 78
Mockingbird .....	28, 43
<i>Molothrus ater</i> .....	53, 80
<i>Molpadia</i> .....	119
Mousley, Henry .....	
The Spring Ladies' Tresses in Canada .....	1
Mudpuppy .....	15
Murre, Atlantic .....	5, 6, 7, 122
Brünnich's .....	5, 6, 7, 38
Muskrat .....	92
<i>Mustela vison</i> .....	92
Mya .....	116
<i>Myiarchus cinerascens</i> .....	40, 76
<i>Myiochanes virens</i> .....	41, 76
<i>Myophoria</i> .....	99, 100
<i>adornata</i> n. sp. .....	99, 100, 101, 103
<i>beringiana</i> .....	100
<i>cairnesi</i> n. sp. .....	99, 100, 101, 103
<i>columbiana</i> n. sp. .....	99, 100, 103

- costata* ..... 100  
*decussata* ..... 100  
*elegans* ..... 100  
*gaytani* ..... 100  
*grahami* ..... 101  
*heslingtonensis* ..... 101  
*inflata* ..... 100  
*margaritifera* ..... 101  
*multicostata* ..... 101  
*nathorsti* ..... 100  
*nuggetensis* ..... 99, 101  
*suttonensis* ..... 100  
*urd* ..... 100  
*zeballos* n. sp. 99, 100, 101, 103  
*zambachiensis* ..... 100  
*Myotis keenii septentrio-*  
*nalis* ..... 91  
*lucifugus lucifugus* ..... 90, 91  
*Mysidia americana* ..... 103  
*Mytilus?* ..... 103  
*shulapsensis* n. sp. 99, 102, 103  

**N**

*Nannus hiemalis* ..... 43, 133  
*Natria setemvittata* ..... 16  
*sipidon* ..... 93  
*sipidon insularum* ..... 16  
*sipidon sipidon* ..... 16  
Naturalists, Canadian, in  
Britain ..... 85  
*Necturus maculosus* ..... 15  
Needham, James G.  
About Ourselves, review  
by A. W. A. B. .... 24  
Neo-Triassic *Cassianella*  
Fauna of Tyaughton  
Creek Valley, B.C., The,  
by F. H. McLearn ..... 99  
*Nepheleopsis obscura* ..... 67, 68  
*Nereis* ..... 116  
*Nettion carolinense* ..... 22  
Newt, Green ..... 15  
Pacific ..... 15  
Nighthawk ..... 39, 75, 132  
Non-Passerine Birds in the  
Bird Sanctuaries of the  
North Shore of the Gulf  
of St. Lawrence, Fourth  
Census of, by Harrison  
F. Lewis ..... 5  
Norris-Elye, L. T. S.  
Suckers and Bull-heads.. 139  
Notes on Some Fish of the  
Eastern Canadian Arctic,  
by T. H. Manning ..... 128  
Notes on the Fauna of  
Bruce Peninsula, Mani-  
toulin and Adjacent Is-  
lands, by M. Y. Williams  
60, 70, 92  
Nuthatch, Red-breasted  
27, 28, 29, 30, 42, 77, 133  
White-breasted  
26, 27, 28, 29, 42, 77  
*Nuttallornis mesoleucus* ... 132  
*Nyctea nyctea* ..... 38  
*Nycteria cinerea* ..... 92  
*Nycticorax nycticorax* ..... 11, 71  
*Nyroca affinis* ..... 22, 140  
*americana* ..... 22  
*collaris* ..... 22, 140  
*marila* ..... 22  
*valisneria* ..... 22  
*longissima* ..... 117  

**O**

*Obelia* ..... 118  
*longissima* ..... 117  
*Odocoileus virginianus* ... 93  
*virginianus borealis* ..... 140  
*Odontosyllis phosphorea* ... 118  
*Oidemia americana* ..... 71  
Old-squaw ..... 23, 27, 28, 30, 121  
*Oligochaeta* ..... 67  
*Oncocottus quadricornis* ... 129  
*Oncorhynchus* ..... 136  
*Ondatra zibethica* ..... 92  
*Opheodrys vernalis* ..... 16, 93  
*Oporornis philadelphia* ... 52  
Oriole, Baltimore ..... 53, 79  
Orchard ..... 53  
*Orthoceras* ..... 99  
Osprey ..... 34, 72  
*Otocoris alpestris* ..... 41, 76  
Ottawa Field-Naturalists'  
Club, Members, and Sub-  
scribers to the Canadian  
Field-Naturalist, Sept.,  
1942 ..... 94  
Otter ..... 92  
Canada ..... 140  
*Otus asio* ..... 38  
*flammeolus* ..... 138  
Oughton, John  
Johnsonia, review of ... 12  
Outline of the Fungi, by G.  
W. Martin, review by J.  
W. G. .... 62  
Ovenbird ..... 52, 79  
Owl, Acadian ..... 39  
American Screech  
26, 27, 28, 29, 38  
Barred ..... 26, 28, 39  
Flammulated Screech ... 138  
Great Grey ..... 39  
Great Horned ..... 28, 29, 38, 74  
Horned ..... 38  
Long-eared ..... 28, 39  
Pygmy ..... 138  
Short-eared ..... 6, 26, 29, 30, 39  
Snowy ..... 26, 28, 38  
*Oryechus vociferus* ..... 36, 73, 131  
*Oxytoma intermedia* ..... 99  

**P**

*Pandion haliaeetus* ..... 34, 72  
*Paphia* ..... 116  
*Paracladiscites* ..... 29  
Partridge, Gray ..... 35  
European Gray 26, 28, 29, 30  
*Passer domesticus* ..... 52, 79, 133  
*Passerculus sandwichensis*  
54, 80  
*Passerella iliaca* ..... 55  
*Passerina cyanea* ..... 53, 80  
Patch, Clyde L.  
A Backyard Beaver ... 46  
*Pecten cadwalladerensis* n. sp.  
99, 102, 103  
*cisionensis* ..... 102  
*inaequistriatus* ..... 102  
*margaritifera* ..... 102  
*nihanianus* ..... 99  
*pontianus* n. sp. 99, 102, 103  
*saccoi* ..... 99  
*subdextilis* ..... 102  
*tyaughtoniae* n. sp. 99, 102, 103  
Peeper, Spring ..... 16  
*Penthestes atricapillus*  
42, 77, 133  
*hudsonicus* ..... 42, 133  
*Perdix perdix* ..... 35  
*Perisoreus canadensis* 42, 77, 132  
*Petrochelidon albifrons*  
42, 77, 140  
Pewee, Wood ..... 41, 76  
*Phalarocorax auritus* ..... 10, 71  
*carbo carbo* ..... 6  
*Phasianus colchicus* ..... 35  
Pheasant, Common ..... 26, 35  
Ring-necked  
26, 27, 28, 29, 30, 35  
*Phenacomys* ..... 56  
*celatus* ..... 57  
*celatus crassus* ..... 57  
*constabiei* ..... 59  
*intermedius* ..... 56  
*intermedius intermedius* 59, 60  
*intermedius laingi* n. subsp.  
59, 60  
*intermedius levis* ..... 58, 60  
*intermedius oramontis* 59, 60  
*latimanus* ..... 57  
*longicaudus* ..... 60  
*mackenzii* ..... 57  
*olympicus* ..... 59, 60  
*oramontis* ..... 60  
*ungava crassus* ..... 57, 60  
*ungava mackenzii* ..... 58, 60  
*ungava soperi* n. subsp. 58, 60  
*ungava ungava* ..... 57, 60  
*Phenacomys*, Northwest  
Coast ..... 59  
Prairie ..... 58  
*Philohela minor* ..... 36, 73  
Phoebe ..... 40  
Eastern ..... 76, 132  
Say's ..... 122  
*Phoronis pacifica* ..... 115  
*Phoronopsis vancouverensis* 116  
*Phrynosoma douglassii* dou-  
glassii ..... 16  
*Phyllograptus ilicifolius* ... 33  
*Picea canadensis* ..... 9  
*mariana* ..... 9  
*Picoides arcticus* ..... 40, 76, 132  
*tridactylus* ..... 132  
Pigeon, Passenger ..... 38  
*Pipilo enucleator* ..... 54  
*Pinna* ..... 99  
Pintail, American 22, 27, 28, 30  
*Pinus rigida* ..... 9  
*Pipilo erythrophthalmus* 54, 80  
Pipit, American ..... 50, 78  
*Piranga erythromelas* ..... 53, 80  
*Pisaster ochraceus* ..... 115, 117  
*Piscicola punctata* ..... 70  
*Pisobia melantos* ..... 37  
*Pituophis catenifer cateni-*  
*fer* ..... 16  
*sayi sayi* ..... 16  
*Placites* ..... 99  
*Placobdella parasitica* ... 70  
*phalaria* ..... 68  
Plant Galls and Gall Mak-  
ers, by Ephraim Porter  
Felt, review by A.W.A.B. 62  
*Plectrophenax nivalis* ..... 55, 81  
*Plethodon cinereus* ..... 15  
*vehiculum* ..... 15  
*Pleurobrachia* ..... 116  
*Pleuromya elongata* ..... 99  
*Plicatula* ..... 99  
Plover, Black-bellied ..... 73  
Killdeer ..... 36, 131  
Piping ..... 36  
Semipalmated ..... 5, 6  
Upland ..... 36  
*Podilymbus podiceps* ..... 10, 71  
*Polistes fuscatus* var. *pal-*  
*lipes* ..... 64-67  
*Polynices lewisii* ..... 116  
*Poocetes gramineus* 54, 80, 133  
Porsild, A. E.  
Miscellaneous Contribu-  
tions from the National  
Herbarium of Canada,  
III ..... 112  
Say's Phoebe (*Sayornis*  
*saya saya*) at Great Bear  
Lake ..... 122  
Porcupine ..... 92  
*Porzana carolina* ..... 36, 131  
Precision with which  
Speckled Trout (*Salveli-*  
*nus fontinalis*) Return to  
the Same Spawning  
Grounds, by V.D. Vladikov 134  
*Procyon lotor* ..... 92  
*Progne subis* ..... 42, 77  
*Pseudacris nigrita septen-*  
*trionalis* ..... 16  
*nigrita triseriata* ..... 16  
Ptarmigan, Willow ..... 5, 6  
*Pteris sturti* ..... 99  
Puffin, Atlantic ..... 5, 6, 7  
*Pungitius pungitius* ..... 129  
*Pycnopodia helianthoides*  
115, 117  

**Q**

*Querquedula discors* ..... 22, 140  
*Quiscalus quisqualis* ..... 55, 80, 133  

**R**

Rabbit, Snowshoe ..... 17  
Raccoon ..... 92  
Racer, Black ..... 16  
Blue ..... 16  
Western Blue ..... 16  
Rail, Sora ..... 36, 131  
Virginia ..... 35, 73  
*Rallus ulicola* ..... 35, 73  
*Rana aurora aurora* ..... 16  
*brachycephala* ..... 16  
*catesbeiana* ..... 16  
*clamitans* ..... 16  
*palustris* ..... 16  
*piapiens* ..... 16, 93  
*pretiosa pretiosa* ..... 16  
*septentrionalis* ..... 16  
*sylvatica cantabrigensis* ..... 16  
*sylvatica latremis* ..... 16  
*sylvatica sylvatica* ..... 16  
Rand, A. L.  
*Larus kumlianti* and its  
Allies ..... 123

- Rangifer caribou* ..... 93  
*Rattle-snake*, Massasauga. . . 93  
*Pacific* ..... 16  
*Prairie* ..... 16  
*Timber* ..... 16  
Raven ..... 26, 42, 77, 121  
Redhead ..... 22  
Redpoll, Common ..... 26, 27, 28, 29, 30  
    Hoary ..... 54  
Redstart, American ..... 52, 79  
*Regulus satrapa* ..... 44, 78  
Report of Council, Sixty-third Annual Meeting of the Ottawa Field-Naturalists' Club ..... 13  
*Rhacophyllites* ..... 99  
Richardson, L. R. Observations on the Migratory Behaviour of Leeches ..... 67  
*Riparia riparia* ..... 41, 76  
*Eissa tridactyla tridactyla* ..... 5  
Robb, Donald L. A Beaver Census in Algonquin Provincial Park ..... 86  
Robin, American ..... 27, 28, 29, 30, 43, 78, 133  
    Western ..... 30  
Roland, A. E. The Ferns of Nova Scotia, review by H. A. S. . . 44  
Ross, Bernard Rogan to Spencer Fullerton Baird. . 120  
Ross, Edna G. Green Heron on Mississippi River, Lanark County, Ontario ..... 138  
S  
*Sagitta* ..... 118  
Salamander, British Columbia ..... 15  
    Clouded ..... 15  
    Dusky ..... 15  
    Four-toed ..... 15  
    Gaspe ..... 15  
    Jefferson's ..... 15  
    Mountain ..... 15  
    Northwestern ..... 15  
    Pacific Giant ..... 15  
    Painted ..... 15  
    Red ..... 15  
    Red-backed ..... 15  
    Spotted ..... 15  
    Tiger ..... 15  
    Two-lined ..... 15  
    Western red-backed ..... 15  
*Salix alba* ..... 110  
*amygdaloides* ..... 104  
*arbusculoides* ..... 104  
*arbusculoides* var. *glabra* ..... 105, 110  
*argyrocampa* ..... 110  
*balsamifera* ..... 109  
*Bebbiana* ..... 105, 108  
*Bebbiana* var. *perrostrata* ..... 105, 108  
*brachycarpa* ..... 105  
*brachycarpa* var. *antimimia* ..... 105  
*brachycarpa* var. *psam-mophila* ..... 105  
*brachypoda* ..... 108  
*candida* ..... 105, 108  
*candida* var. *denudata* ..... 105  
*cordata* ..... 110  
*curtiflora* ..... 110  
*daphnoides* ..... 110  
*desertorum* ..... 105, 110  
*discolor* ..... 105, 106, 108, 109  
*discolor* var. *primoides* ..... 106  
*erythrocoma* ..... 110  
*exigua* ..... 106  
*exigua* var. *lutescens* ..... 106  
*glauca* ..... 106  
*glauca* var. *acutifolia* ..... 106  
*glauca* var. *acutiloba* ..... 106  
*glauca* var. *glabrescens* ..... 106  
*gracilis* ..... 108, 110  
*Hookerana* ..... 110  
*humilis* ..... 106  
*interior* ..... 106  
*interior* var. *pedicellata* ..... 106  
*interior* var. *Wheeleri* ..... 106  
*lancifolia* ..... 107  
*lasiandra* ..... 107  
*linearifolia* ..... 106  
*longifolia* ..... 106  
*lucida* ..... 107  
*lucida* var. *angustifolia* ..... 107  
*lucida* var. *intonsa* ..... 107  
*lutea* ..... 107, 110  
*MacCalliana* ..... 107  
*Mackenziana* ..... 110  
*myrtilifolia* ..... 106, 107, 110  
*Nelsonii* ..... 109  
*pedicellaris* ..... 106  
*pedicellaris* var. *hypopellita* ..... 108  
*pellita* ..... 108  
*pentandra* ..... 110  
*perrostrata* ..... 105  
*petiolaris* ..... 108  
*petiolaris* var. *rosmarinoides* ..... 110  
*planifolia* ..... 108, 109  
*planifolia* var. *Nelsonii* ..... 109  
*primoides* ..... 106  
*pseudocordata* ..... 110  
*pseudomonticola* ..... 109  
*pyrifolia* ..... 109  
*rostrata* ..... 105  
*saskatchewaniana* ..... 105, 110  
*Scouleriana* ..... 109  
*serissima* ..... 107, 109  
*silicicola* ..... 109  
*subcoreulea* ..... 108  
*Turnorii* ..... 109  
*Tyrellii* ..... 110  
*Wheeleri* ..... 107  
*Salvelinus alpinus* ..... 128  
*fontinalis* ..... 134  
*hearnii* ..... 128  
*rossii* ..... 128  
*stagnalis* ..... 128  
Sandpiper, Pectoral ..... 37  
    Red-backed ..... 30  
    Solitary ..... 37, 74, 131  
    Spotted ..... 5, 6, 37, 74, 131  
Sapsucker, Yellow-bellied ..... 40, 75, 132  
*Sarsia mirabilis* ..... 118  
*Saxidomus* ..... 116  
*Sayornis phoebe* ..... 40, 76, 132  
*saya saya* ..... 122  
Say's Phoebe (*Sayornis saya saya*) at Great Bear Lake by A. C. Porsild ..... 122  
*Scaphiopus hammondi* ..... 15  
*Scaphoideae* ..... 100  
Scaup, Greater ..... 22, 27, 28, 29, 30  
    Lesser ..... 22, 29, 140  
*Sceloporus occidentalis occidentalis* ..... 16  
*Schizothaerus* ..... 116  
*Sclurus carolinensis* ..... 92  
*hudsonicus* ..... 92  
Scoter ..... 121  
    American ..... 30, 71  
    White-winged ..... 23, 28, 29, 30, 71  
    Surf ..... 30  
*Scotiapterx nebulosa* ..... 39  
Sculpin, Four-spined ..... 129  
Sea Urchin from the Cretaceous in Manitoba, A. by E. Leith ..... 4  
*Seiurus aurocapillus* ..... 52, 79  
*novboracensis* ..... 52, 133  
*Setophaga ruticilla* ..... 52, 79  
Shepard, Harold H. and Ralph W. Macy Butterflies, review by A. W. A. B. ..... 12  
Shoveller ..... 22, 27  
Shrike, Common ..... 78  
    Migrant ..... 50  
    Northern ..... 27, 29, 50  
*Sialia sialis* ..... 44, 78, 133  
    Siskin, Pine ..... 26, 27, 29, 30, 54, 133  
*Sistrurus catenatus* ..... 93  
*catenatus catenatus* ..... 16  
*Sitta canadensis* ..... 42, 77, 133  
*carolinensis* ..... 42, 77  
Skink, Blue-tailed ..... 16  
    Northern ..... 16  
Skilton's ..... 16  
Skunk ..... 92  
Smith, Harlan Ingersoll, 1872-1940, by D. L. .... 114  
Snake, Dekay's ..... 16  
    Eastern Fox ..... 16  
    Eastern Ring-necked ..... 16  
    Hog-nosed ..... 16  
    Island Water ..... 16  
    Milk ..... 16  
    Northern Water ..... 16, 93  
    Pacific Gopher ..... 16  
    Pilot Black ..... 16  
    Queen ..... 16  
    Red-bellied ..... 16  
    Ribbon ..... 16  
    Say's Gopher ..... 16  
    Smooth Green ..... 16, 93  
    Western Hog-nosed ..... 16  
Snipe, Wilson's ..... 30, 36, 74, 131  
Snowshoe Rabbit Enquiry, 1939-40, The, by Dennis and Helen Chitty ..... 17  
*Somateria mollissima dresseri* ..... 6  
*spectabilis* ..... 23  
Soper, J. Dewey History, Range, and Home Life of Northern Bison, review by C. H. D. C. . . 94  
    The Long-tailed Chat in Saskatchewan ..... 82  
*Sparanium glomeratum* ..... 112  
Sparrow, Chipping ..... 54, 81, 133  
    Clay-colored ..... 140  
    English ..... 26, 27, 28, 29, 30, 52, 79, 133  
    Field ..... 55  
    Fox ..... 55  
    Rusty Song ..... 30  
    Savannah ..... 28, 54, 80  
    Song ..... 27, 28, 29, 55, 81, 133  
    Sooty Fox ..... 30  
    Swamp ..... 28, 55, 133  
    Tree ..... 26, 27, 28, 29, 54, 80  
    Vesper ..... 54, 80, 133  
    White-crowned ..... 55, 81  
    White-throated ..... 27, 28, 29, 55, 81  
*Spatula clypeata* ..... 22  
Spencer, G. J. and M. Y. Williams The Flamulated Screech Owl at Kamloops ..... 138  
*Sphyrapicus varius* ..... 40, 75, 132  
*Spinus pinus* ..... 54, 133  
*tristis* ..... 54, 80  
*Spiranthes cernua* ..... 1, 2  
*Romanzoffiana* ..... 1, 2  
*vernalis* ..... 1, 2  
*Spizella arborea* ..... 54, 80  
*pallida* ..... 140  
*passerina* ..... 54, 81, 133  
*pusilla* ..... 55  
Spring Ladies' Tresses in Canada, The, by Henry Mousley ..... 1  
*Squatarola squatarola* ..... 73  
Squirrel, Northern Gray ..... 32  
    Red ..... 92  
Starling, Common ..... 26, 27, 28, 29, 30, 50, 78, 140  
Status of the Philadelphia Vireo at Winnipeg, by R. D. Harris ..... 137  
*Stelgidopteryx ruficollis* ..... 41, 140  
*Stenodus mackenzii* ..... 121  
*Sterna hirundo* ..... 37, 74  
*Sternotherus odoratus* ..... 16  
Stickleback, Nine-spined ..... 129  
*Storeria dekayi* ..... 16  
*occipitamaculata* ..... 16  
*Strix varia* ..... 39  
*Strombus* ..... 12  
*Sturnella magna* ..... 53, 79  
*Sturnus vulgaris* ..... 50, 78, 140  
Sucker, Common ..... 139  
Suckers and Bull-heads, by L. T. S. Norris-Elye ..... 139  
*Sula bassana* ..... 10  
Summer Birds of the Madsen Area, Patricia District Ontario, The, by E. V. Goodwill ..... 131  
Swallow, American Rough-winged ..... 41, 140  
    Bank ..... 41, 76  
    Barn ..... 41, 76  
    Cliff ..... 42, 77, 140  
    Tree ..... 41, 76, 132



Swan, Trumpeter .....	122
Whistling .....	11, 122
Swift, Chimney .....	39, 75
Swift, Pacific .....	16
<i>Synaptomys</i> .....	60
<i>Syncomys mirabilis</i> .....	118
Systematics, The New, Editorial .....	63

## T

<i>Tamias striatus</i> .....	92
Tanager, Scarlet .....	53, 80
Taverner, P. A., retirement .....	126
Teal, Blue-winged .....	22, 140
Green-winged .....	5, 6, 22, 39
<i>Telmatodytes palustris</i> .....	43
<i>Terebratalia transversa</i> .....	115
Tern, Arctic .....	5, 6
Black .....	37, 74
Caspian .....	5, 6, 74
Common .....	5, 6, 37, 74
<i>Thamnophis butleri</i> .....	16
<i>ordinoides elegans</i> .....	16
<i>ordinoides ordinoides</i> .....	16
<i>ordinoides vagrans</i> .....	16
<i>radix</i> .....	16
<i>sauritus sauritus</i> .....	16
<i>sirtalis</i> .....	93
<i>sirtalis concinnus</i> .....	16
<i>sirtalis parietalis</i> .....	16
<i>sirtalis sirtalis</i> .....	16
Thrasher, Bown .....	43, 78
Thrush, Hermit .....	44, 78, 133
Olive-backed .....	44
Varied .....	30
Wilson's .....	44, 78, 133
Wood .....	43
<i>Thuja occidentalis</i> .....	9
<i>Thymallus signifer</i> .....	120
Toad, American .....	15, 93
American Ribbed .....	15
Canadian .....	16
Fowler's .....	15
Great Plains .....	15
Hudson Bay .....	15
Northwestern .....	15
Tree .....	93
Varying Tree .....	16
Western Spadefoot .....	15
<i>Tomopteris</i> .....	118
Toner, G. C., W. E. Edwards and Murray W. Curtis .....	
Birds of Leeds County, Ontario .....	8, 21, 34, 50
Toner, G. C. and E. B. S. Logier .....	
Amphibians and Reptiles of Canada .....	15
Attention Herpetologists .....	126
<i>Totanus flavipes</i> .....	37, 74
<i>melanoleucus</i> .....	37
Towhee, Eastern .....	54, 80
Oregon .....	30
<i>Toxostoma rufum</i> .....	43, 78
Trees of the Eastern United States and Canada, by W. S. Harlow, review by A. W. A. B. .....	82
<i>Triarthrus</i> .....	33
<i>Trigonia</i> .....	100
<i>gaytani</i> .....	100
<i>inexpectata</i> .....	100
<i>textilis</i> .....	101
<i>zambachiensis</i> .....	100
<i>Tringa solitaria</i> .....	37, 74, 131
<i>Triturus torosus torosus</i> .....	15
<i>viridescens viridescens</i> .....	15
<i>Troglodytes aedon</i> .....	43, 77
Trout, Lake .....	129
Speckled .....	134
Tufts, Virginia .....	
Andrew Downs, 1811-1892, An Appreciation .....	81
<i>Turdus migratorius</i> .....	43, 78, 133
Turnstone, Common .....	140
Ruddy .....	36

Turtle, Atlantic Leather-back .....	16
Bell's Painted .....	16
Blanding's .....	16
Eastern Painted .....	16
Loggerhead .....	16
Map .....	16
Musk .....	16
Pacific Leatherback .....	16
Painted .....	93
Snapping .....	16, 93
Spiny Soft-shelled .....	16
Spotted .....	16
Western Painted .....	16
Western Pond .....	16
Wood .....	16
Twayblade, Southern .....	2
<i>Tyrannus tyrannus</i> .....	40, 76

## U

<i>undulatae</i> .....	100
<i>Upogebia pugettensis</i> .....	116
<i>Uria aalge</i> .....	122
<i>aalge aalge</i> .....	7
<i>lomvia</i> .....	38
<i>lomvia lomvia</i> .....	7
Urquhart, F. A. .....	
The Dermaptera of Ontario .....	3

## V

<i>Vermivora ruficapilla</i> .....	51
Vertebrate Fauna of Darlington Township, Durham County, Ontario, Some Additions to the, by A. E. Allin .....	140
<i>Vireo flavifrons</i> .....	50
<i>gilvus</i> .....	51, 78
<i>olivacea</i> .....	51, 78
<i>philadelphicus</i> .....	51
Vireo, Philadelphia .....	51
Red-eyed .....	51, 78
Warbling .....	51, 78
Yellow-throated .....	50
<i>Vireosylva philadelphica</i> .....	137
Vladykov, V. D. .....	
Precision with which Speckled Trout ( <i>Salvelinus fontinalis</i> ) Return to the Same Spawning Grounds .....	134
Voles, Canadian, of the Genus <i>Phenacomys</i> with Description of Two New Canadian Subspecies, by R. M. Anderson .....	56
Voles, Mice and Lemmings. Problems in Population Dynamics, by Charles Elton, review by J. R. D. .....	82
<i>Vulpes fulva</i> .....	92, 140

## W

Warbler, Audubon's .....	30
Bay-breasted .....	52, 133
Black and White .....	51, 78
Blackburnian .....	52
Black-poll .....	52
Black-throated Blue .....	51, 79
Black-throated Green .....	52, 79
Cape May .....	51
Cerulean .....	52
Chestnut-sided .....	52, 79
Magnolia .....	51, 79, 133
Mourning .....	52
Myrtle .....	51, 79, 133
Nashville .....	51
Parula .....	51
Pine .....	52
Yellow .....	51, 78
Wasp, Mass Movement of the, by Geoffrey Beall .....	64
Waterfowl, Observations on the Raising of, in Southern Ontario, by H. G. Mack .....	48
Water-thrush, Northern .....	52, 133
Waxwing, Bohemian .....	30, 50
Cedar .....	26, 28, 50, 78, 133

Whip-Poor-Will .....	39, 75
Williams, M. Y. .....	
Notes on the Fauna of Bruce Peninsula, Manitoulin and Adjacent Islands .....	60, 70, 92
Williams, M. Y. and G. J. Spencer .....	
The Flammulated Screech Owl at Kamloops .....	138
Willow, Autumn .....	109
Basket .....	108
Balsam .....	109
Blueberry .....	107
Bog .....	108
False Mountain .....	109
Flat-leaved .....	108
Grey .....	105
Hoary .....	105
Low .....	106
MacCalla's .....	107
Northern .....	106
Peach-leaved .....	104
Pussy .....	105
Red .....	107
Sandbar .....	106
Satiny .....	108
Scouler's .....	109
Shining .....	107
Short-capsuled .....	105
Shrubby .....	104
Slender .....	106
Turnor's .....	109
Tyrell's .....	110
Yellow .....	107
Willows of Saskatchewan, Notes on the, by W. P. Fraser .....	104
Wilson, Alice E. .....	
Edward Martin Kindle .....	31
Wolf, Brush .....	92
Timber .....	92
Wood, A. A. .....	
Cold Storage as an Aid to the Busy Ornithologist .....	137
Hybrid Flicker at Chatham, Ontario .....	122
Woodchuck .....	92
Woodcock, American .....	36, 73
Woodpecker, American .....	
Three-toed .....	26, 27, 132
Arctic Three-toed .....	40, 76, 132
Downy .....	26, 27, 28, 29, 30, 40, 76, 132
Gairdner's .....	30
Hairy .....	26, 27, 28, 29, 30, 40, 75, 132
Harris' .....	30
Pileated .....	27, 29, 30, 40, 75
Woodpecker, Red-bellied, in Manitoba, by B. W. Cartwright .....	45
Woodpecker, Red-headed .....	40, 75
Wren, Carolina .....	28
House .....	43, 77
Prairie Marsh .....	43
Seattle .....	30
Short-billed Marsh .....	43, 140
Winter .....	30, 43, 133

## Y

Yellowlegs, Greater .....	37, 74
Lesser .....	37, 74
Yellow-throat, Maryland .....	52, 79

## Z

<i>Zenaidura macroura</i> .....	38, 74
<i>Zonotrichia albicollis leucophrys</i> .....	55, 81

## ERRATA

In No. 7, October, page 100, the following corrections should be made:  
 For *Gruenewadia* read *Gruenewaldia*.  
 For *Trigonia gaytanni* read *Trigonia gaytani*.



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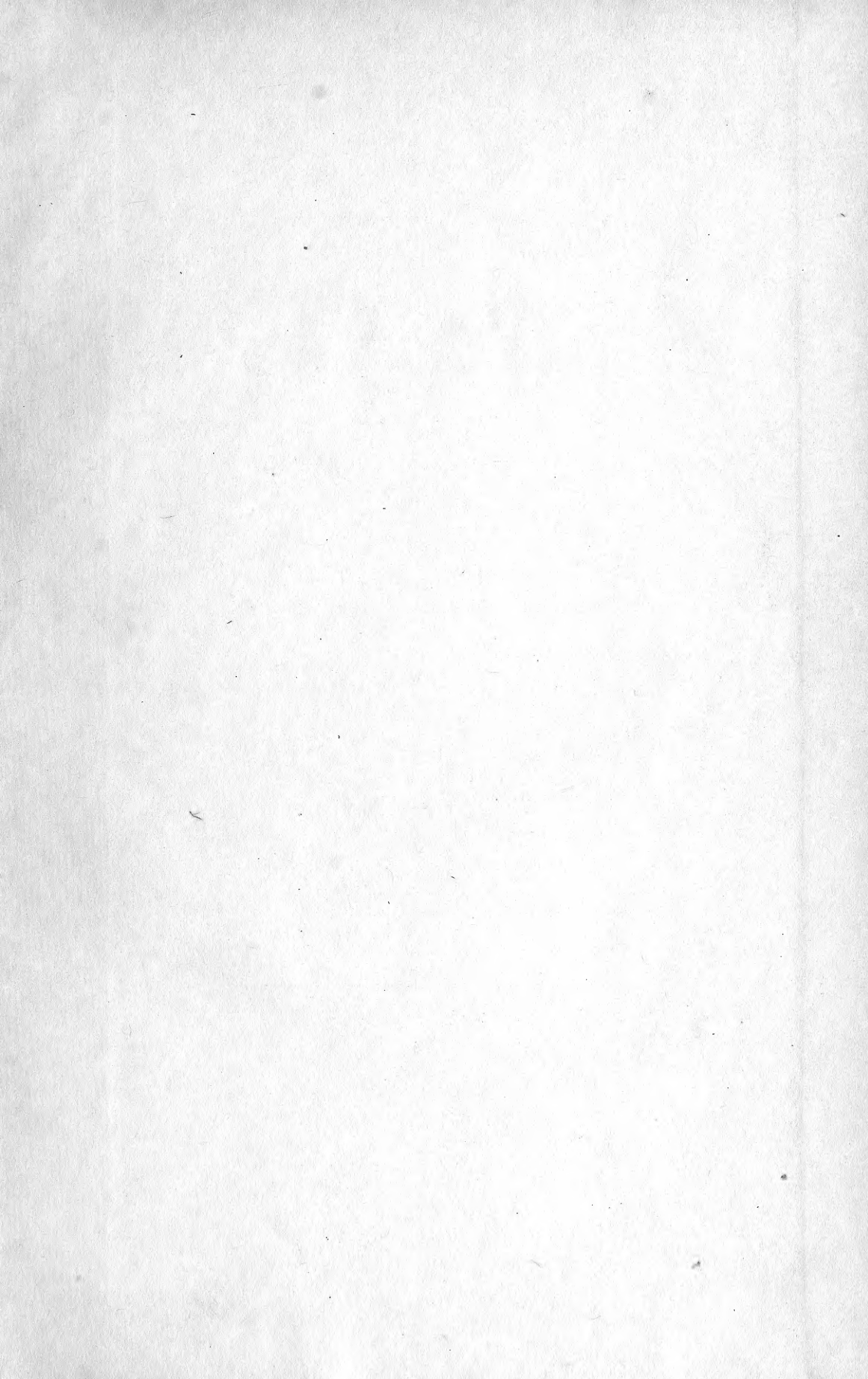
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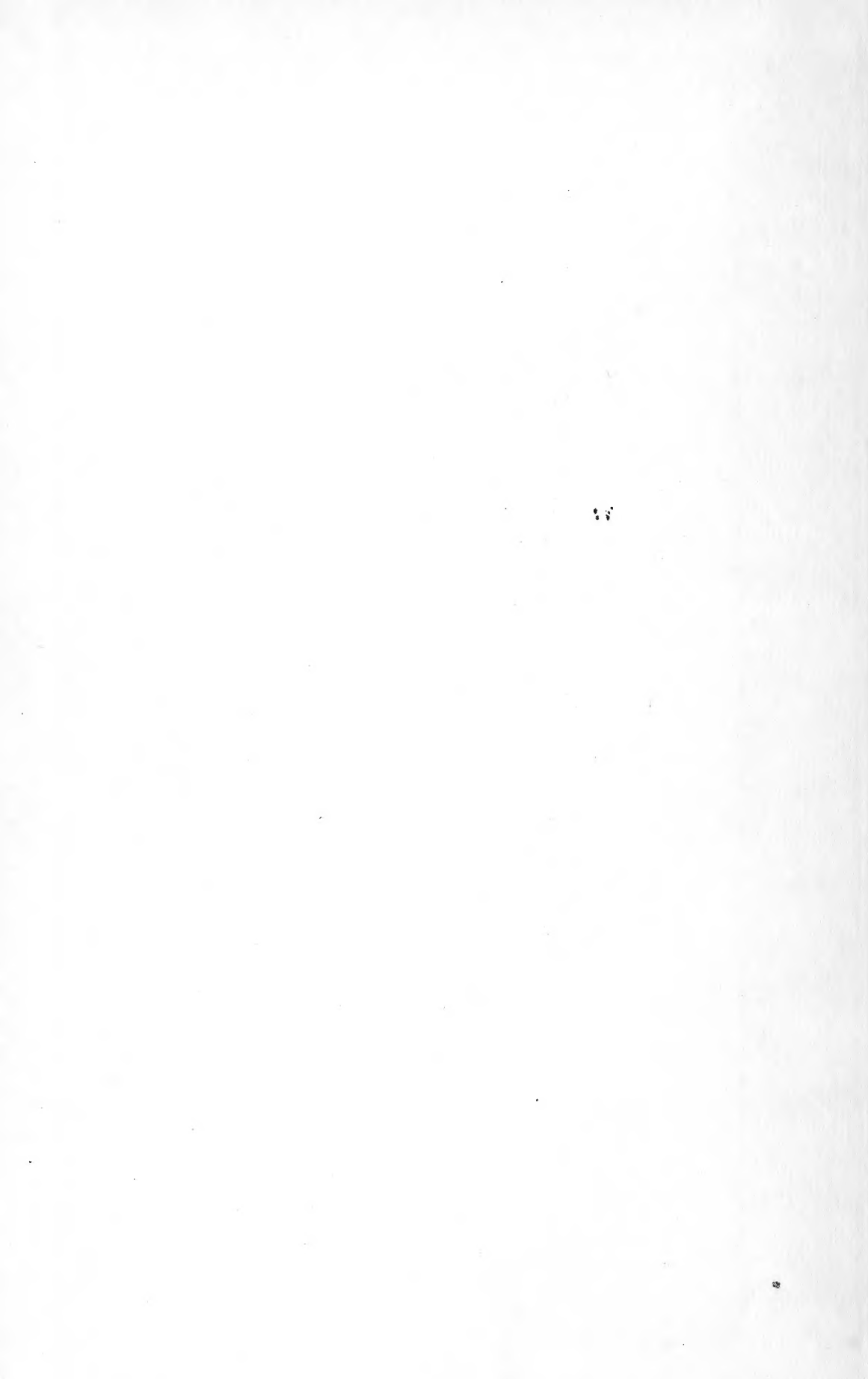
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